AVIATION

The Oldest American Aeronautical Magazine

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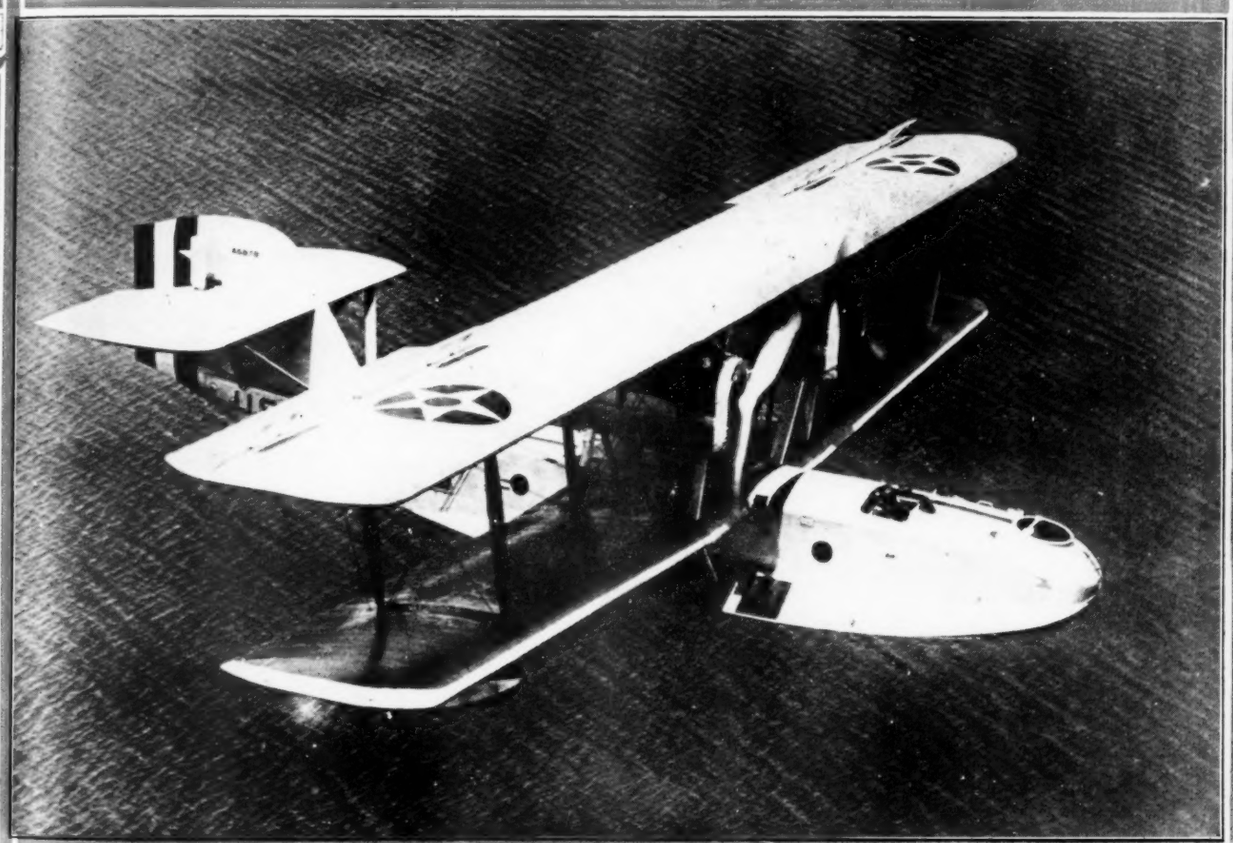

One of the new all-duralumin PN-10's for the panama flight

(c) Miller Photo

VOLUME XVI

NUMBER 18

SPECIAL FEATURES

DURALUMIN AND ITS CORROSION
THE LYMPNE LIGHTPLANE COMPETITION
THE PITCAIRN SESQUI-WING

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NOVEMBER 1, 1926

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VOL. XXI. NO. 18

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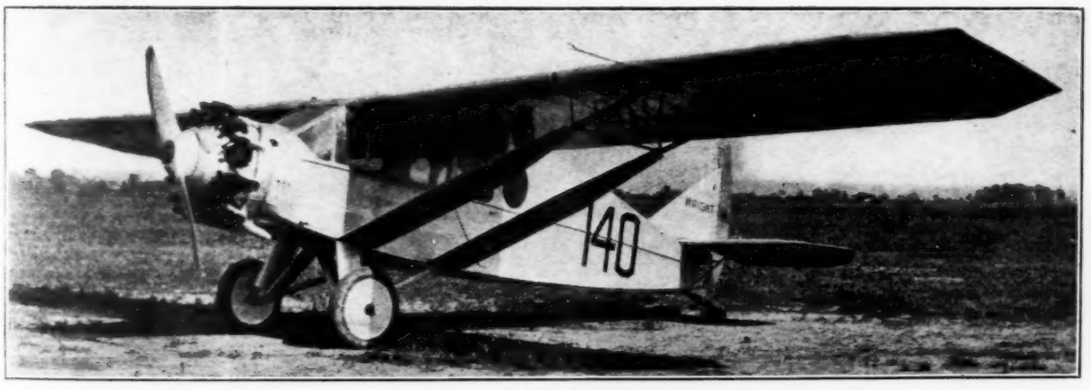

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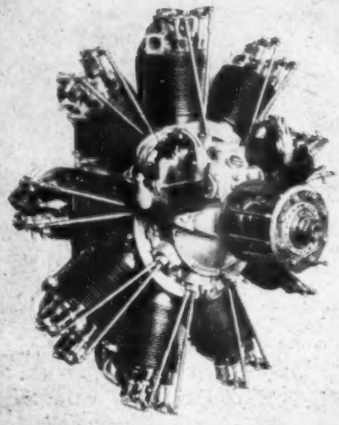

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VOL. XXI NOVEMBER 1, 1926 No. 18

Efficient Flying

IN THIS issue of AVIATION considerable space is given to the recent lightplane competition held at Lympne, England. The basis upon which this competition was judged was one which made fuel economy a criterion, the "figure of merit" being Lb. Useful Load X Miles Flown ÷ Lb. Fuel Used, which, assuming each plane covered the total mileage, resolves itself into useful load per pound of fuel. But, from many standpoints there is no doubt that the true economy of flying must be judged from more considerations than pure fuel economy, even if it be true that these other considerations eventually resolve themselves into fuel economy.

As indications of what can be done in the way of economic flying, the performances of the lightplanes at Lympne are most striking. For example, the winner of the competition, one of the two Hawker Cygnet planes equipped with a 34 hp. Bristol Cherub engine, according to the official results, consumed 388.83 lb. of gasoline during the week of the tests during which time 1,994 miles were covered. Assuming gasoline to weigh approximately 7 lb. per gal., which is somewhat less than is sometimes accepted, this consumption represents 55.3 gal. for the 1,994 miles, which works out at a fraction under 36 miles per gallon of gasoline, and this, carrying a useful load of 429 lb. This useful load may be assumed, for the purposes of comparison, to be equivalent to, say, two passengers of 150 lb. each and over 100 lb. of extra load. Such a load on so low a fuel consumption compares with automobile performance in a manner somewhat to the shame of the latter.

Of course, it has to be remembered, that, in actual fact, neither this particular lightplane, nor any other, for that matter, actually had space for carrying two passengers in addition to the pilot so that the comparison is not altogether sound, but it does indicate in a most striking manner the stage of efficiency to which aeronautics, including both airplane and engine design, has progressed.

Perhaps even more significant is the case of the Avro Avian, which, while it did not finish the competition, actually put up some very remarkable performances indicative of what can be done in matter of economic flying. This machine carried a useful load, in addition to the pilot, a little over 19 per cent greater than the empty weight of the plane, the actual figures being 695 lb. empty weight and 827½ lb. of useful load carried. Thus, the total loaded weight of this plane is exactly 2.3 times greater than its empty weight. With its 60 hp. engine, these figures represent 13.8 lb. of useful load per horsepower, assuming the engine running at full throttle. Compared with a modern commercial passenger airplane which carries an average of 3.1 lb. useful load per horsepower, the case of the lightplane is remarkably good.

Again, however, it must be recalled that in carrying this useful load of 827½ lb. the Avian was loaded up with lead bars tied on outside the fuselage, there being nothing like sufficient room for such a load in the plane. So that it would appear somewhat unreasonable to view this as "useful" load in the strict sense of the term. It should be remembered, however, that in a competition of this nature, the results are to be taken more as indications of technical progress than of actual possibilities in general service. Assume, for example, that the wings of the Avian were made somewhat smaller and the load reduced to an amount which could strictly be termed "useful", the speed would increase considerably, raising the 96 m.p.h. or more of the present plane, to something well over 100 m.p.h. and a real economic two-seater touring airplane result.

It may seem, perhaps, that, in order to put up such economic performances, the lightplane must be greatly underpowered, yet such does not, in practice, appear to be the case. Not only the British lightplanes, but those produced in America and elsewhere, have, in general, indicated no lack of reserve power. It appears to be merely a matter of advanced aerodynamic design. Just as we have come to consider from 20 to 60 hp. ample for an automobile carrying from five to seven passengers, so we are proving that, in flying, from 35 to 60 hp. is all that is necessary to carry two people in normal air touring.

Gliding As a Means of Flying Instruction

IT HAS been reported that one of the early pioneer fliers in England is planning the opening of a school of gliding near London where intending students of flying may receive preliminary instruction in the elements of airplane control. This idea is by no means a new one and may, in fact, be considered to be a basic proposal, since many of our greatest pioneer fliers first learned the art with gliders. With the science of aerodynamics developed to the stage we find it in at this time, the modern glider is by no means the unsafe proposition it was in the pioneer days.

Elementary flying instruction on powerless gliders is certainly an attractive proposition for, apart from its economical aspects, there must be a good deal of sport attached to it. For a city located comparatively near hilly country, there seems every reason for believing that, if the method is sound, pupils will be forthcoming in considerable numbers since the cost of such instruction must of necessity be very reasonable.

An important point, however, arises in connection with the precise value to airplane piloting of experience gained in gliding. The peculiar behavior of the control surfaces of some gliders under certain circumstances have tended to indicate that the control of a glider is vitally different from that of a power-driven airplane. Even should this be the case, however, it would seem that there might be much that could be learned in the matter of what may be termed flying touch in glider practice which would be of great value when the time came for instruction upon a power-driven airplane.

Duralumin and Its Corrosion

By WM. NELSON
Lieut. Comdr. (CC) U. S. N.

THE CORROSION of duralumin is real, and it is perhaps the most important factor extant that prevents its wholesale employment in general engineering where light weight is an advantage. According to the early advocates of this metal, duralumin was classed with the fine metals in its ability to remain bright and cheerful in the face of corroding influences. Engineers, impressed with the many other advantages of this aluminum alloy, took to it readily and made extensive applications, particularly as a structural material for aircraft. As the products of duralumin were put into use and service, reports began coming back to the designers that rapid deterioration of the metal due to certain corroding mediums was taking place.

Complicity of Corrosion Problem

During the fifteen years that duralumin has been known, much discussion has taken place and many divergent views have been expressed on the question of the susceptibility of duralumin to corrosion. That this should be the case in view of our experiences with rusting in steel seems odd; but when the records show that on the one hand duralumin structures have been used for years in airships with very slight corrosion and on the other hand intensive corrosion has taken place in similar structures within a few months, we can realize that varying results cause varying opinions. However, a judicious investigation of these results brings out the all important factor that variations in the conditions of exposure are practically entirely responsible for the apparent inconsistencies. This should not be construed to mean that the type and degree of exposure is the only variable, for that is hardly the case; but, where widely different results between two duralumin structures occur, the differences can, as a rule, be traced to the corroding mediums.

The corrosion in duralumin has been compared with rusting in steel and failure in other aluminum alloys. It is hardly practicable to compare duralumin and steel corrosions. Our experience with steel in structures has been with relatively thick sections where a little rust has not materially affected the strength. Our experience with this aluminum alloy as a structural material has been with very thin sections where a little corrosion has gone a long way. However, in a salt atmosphere, rust on steel and oxide on duralumin appear after approximately the same time of exposure, but from then on the corrosion in each is manifestly different.

The latitude allowed in comparing deterioration in aluminum alloys is great because the amount of corrosion in these metals is usually determined by a visual inspection. The loss of weight method is not readily applicable. The loss of strength method is not usually employed.

To state that duralumin is not subject to corrosion is entirely misleading. It is better to say that all duralumins corrode more or less, depending on the factors controlling, and these factors are usually outside influences.

First Evidences

The types of corrosion ordinarily found in duralumin can be classified more or less by degrees or by stages. No effort will be made here to describe the many types, but the usual first evidence is a gray white powder deposit much like dust on the surface of the alloy. It goes from this, if the exposure is continued, through various stages until it reaches a point where the metal breaks up in a scaly sort of mass such as deteriorated zinc.

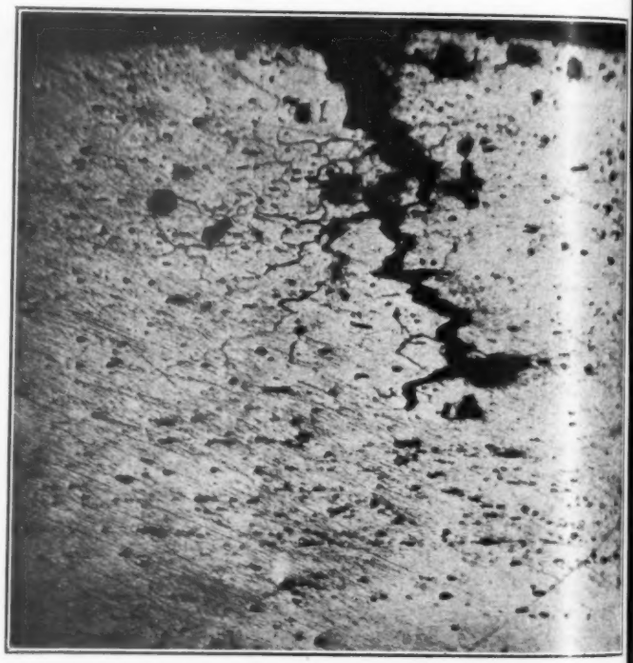
A type of corrosion which may or may not be related to those mentioned, and one that is difficult to contend with, is intercrystalline corrosion. Its presence cannot be readily detected without the use of a microscope, but it does manifest itself by embrittlement of the material. This type of corrosion can be described as consisting of fissures or cracks between the crystals outlining very distinctly the crystals making up the duralumin. They extend in from the surface as a rule and are not found all along the surface. Polishing and etching of specimens are necessary to get a certain indication that this type of corrosion exists in piece of duralumin.

Factors Governing Corrosion

The factors that generally govern the amount of corrosion which will take place in duralumin can be given as follows:—

(1) The chemical composition of the alloy;
(2) The physical condition of the alloy;
(3) The corroding medium including its composition, temperature, condition, etc.;
(4) The time of exposure; and
(5) The presence of other metals.

The chemical composition of duralumin includes magnesium, aluminum, manganese, iron, copper and silicon. They have been named in the order in which they appear in the electrochemical series. A large spread exists, and it can be readily



Severe intercrystalline corrosion; magnified to 100 *times*

understood when consideration is given to the elements themselves and the combinations they make with each other that a great variety of electrolytic actions are possible and probable when duralumin is placed in an electrolyte. These electrolytic actions will vary with variations in the chemical composition and the net result will undoubtedly be corrosion to suit. So far, in the development of duralumin, the chemical compositions have been dictated by the physical properties desired, so it is not likely that much can be done in the direction of corrosion control by control of elements for the present. It might be well to note that magnesium, in its usual forms, is particularly susceptible to rapid deterioration in a corroding atmosphere. It is not believed that iron or silicon play any important role in this respect.

Cold rolling and working the material, produce the same results as far as corrosion is concerned. In general, hard worked aluminum will appear more corroded than annealed material subjected to the same conditions. Duralumin which

has been moderately hard rolled, however, shows a very low rate of reduction in physical properties when subjected to corroding influences compared to the reduction obtaining in heat treated material. Nevertheless, it is believed that severely hard rolled material is very susceptible to corrosion. These variations in the ability of this material to withstand the action of a certain medium might be explained by changes in the potential of the alloy, by differences in the oxide films on the surfaces, or by changes in the solubility of the alloying constituents.

Welds made in duralumin by torch seem to be particularly susceptible to corrosion. Sometimes the concentrated corrosion takes place a short distance away from the weld and at other times right in the weld. This may be due to differences in the composition of the metals or it may be due to the welding fluxes. Either riveting or special protection to welds will have to be resorted to in seams if the localized attacks are to be avoided.

Scratching or abrading the surface of the metal tends to cause localized attacks in these places. This is undoubtedly due to the fact that recesses formed by such scratching afford a convenient rest for corroding liquids. It may be enhanced also by the rupture of the oxide film on the surface of the duralumin. A noteworthy consideration in this connection is the greater resistance to corrosion obtained by highly polishing the surface of the metal.

Corroding Mediums

The corroding mediums are perhaps the most important of the factors in the deterioration of aluminum alloys. Practically all degrees of corrosion can be attained by varying the medium to which the material is subjected; but those encountered in ordinary practice will be the only ones discussed here. These can be classified in a general way as follows:—

(1) Ordinary inland atmospheres;
(2) Salt atmospheres;
(3) Fresh and salt water;
(4) Liquid fuels;
(5) Acids;
(6) Alkalies.

When an aluminum alloy is exposed to the air, a thin transparent film of aluminum oxide forms on the surface. This film is practically ever present after duralumin leaves the mill unless it is purposely removed by chemical or mechanical means. It undoubtedly acts in a measure as a protective coating but is easily broken by abrasion when the material is put into use. Outside of forming the aluminum oxide film, ordinary atmospheres relatively free of moisture and contaminating gases have little or no effect on duralumin. Atmospheres which are heavy with moisture such as fog, rain, etc., cause a very slow deterioration of duralumin which in a majority of the cases does not require special attention. The great difficulty with such a proposition is that moisture will get into the structure in places and stand for long periods and will cause localized attacks. The oxide film is not watertight and cannot form a protective coating against most corroding mediums although it will last for long periods in ordinary atmospheres.

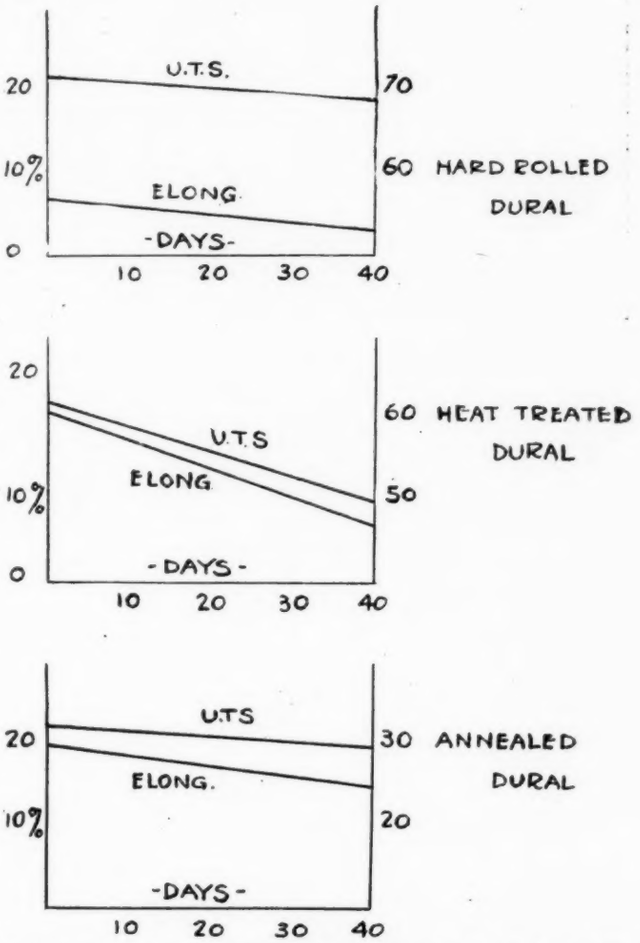
Corrosion From Salt Atmosphere

Salt atmospheres such as are encountered at sea and near the sea coast cause a relatively rapid corrosion of duralumin when compared to that caused by ordinary atmospheres. The reduction in the physical properties of duralumin exposed to salt atmospheres is not as great as that produced by salt water; but since most structures which are liable to be subjected to salt atmospheres will also meet salt spray and salt water, the corrosion is worthy of note and protective means should be provided.

In considering the effect of water on duralumin, a solution or a chemical reaction or an electrolytic action might be effected, or it is possible that combinations of these may result. To attribute the corrosion of duralumin to one or the other is difficult. However, duralumin in ordinary tap water corrodes in spots below the water line and rather evenly at the water line. The corrosion at the water level is usually more rapid than that which takes place below that level. This may be due in part to the gas and liquid condition existing at that point. Salt water or sea water is particularly active on duralumin. In the ordinary service of aircraft it is believed that this is the most difficult corroding medium to contend with. The corrosion of duralumin in sea water will run from two to ten times as much as is the case in tap water. The chloride solutions are much more active in corroding aluminum alloys than the sulphates, nitrates, and practically all the other common salt solutions. Sodium and calcium chloride solutions are used for inducing corrosion and the effect of placing duralumin in intermittent or continuous contact with these solutions is to cause corrosion which reduces the physical properties of the material considerably and rapidly. This may manifest itself as intercrystalline corrosion in addition to producing surface corrosion.

Effects of Fuel

Fuels such as gasoline, alcohol, etc., attack duralumin slightly if any water is present in the fuel. The degree of the corrosion is not sufficient, however, to make any special provision against it inside of fuel tanks, etc. Some of the special preparations (picric acid) used in fuels to increase their efficiency may corrode duralumin to a serious extent. The avoiding of fuel dopes with an acid base seems to be the only alternative.

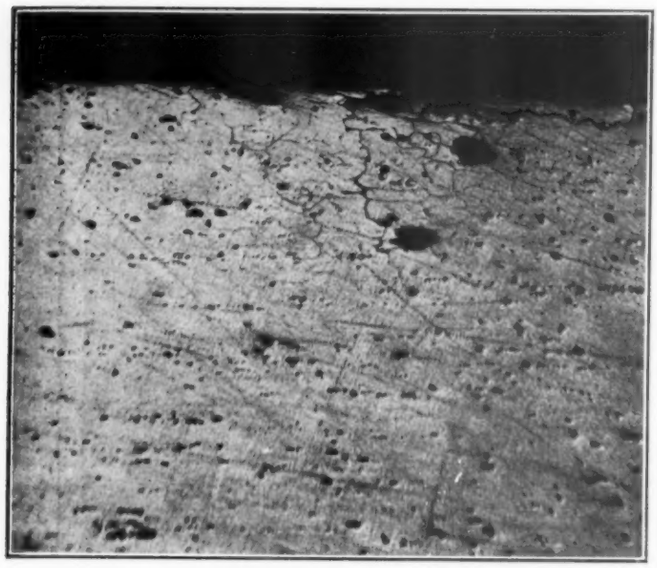


Reductions in ultimate tensile strength and elongation of duralumin sheet 1/16 in. thick when subjected to normal solution salt spray.

Practically all of the acids attack duralumin. Hydrochloric acid is very active on this metal causing pitting. Nitric and sulphuric acids attack duralumin rather uniformly leaving a slightly etched surface. Other acids such as acetic, picric, oxalic, oleic are slow in their actions on duralumin but do corrode sufficiently to warrant special measures to prevent contact. Battery acids spilled on duralumin structures in service have been known to completely destroy the structures affected.

The alkalies are perhaps the most active in their action on duralumin. They cause a more or less uniform attack and reduce the original proportions of the metal very rapidly. A satin finish can be produced on duralumin with facility by dipping it in a hot lye solution. Cleaning compounds containing alkalies are a source of danger to duralumin in service.

Some special materials which are used on duralumin from time to time under varying circumstances may or may not cause actions which are intensive enough to warrant special attention depending somewhat on the circumstances. Duralumin left in carbon tetrachloride for relatively long periods will show signs of corrosion. Although sodium and potassium



Intercrystalline corrosion in duralumin as brought out by etching

nitrate solutions do not cause embrittlement in the way chloride solutions do they leave strong evidences of a uniform corrosion. Ammonia causes a uniform attack on duralumin. Iodine and bromine attack duralumin.

The time element in considering any corrosive action is important also. It cannot be definitely stated that the amount of corrosion in duralumin is directly proportional to the time. This is due to the fact that the first products of corrosion tend to protect the metal in a measure, so that the usual result is rapid action in the beginning with a slowing up as the corrosion proceeds. However, in most cases in service the amount of corrosion necessary to produce a protection is so great that the structure is impaired; so for all practical purposes the amount can be assumed to be directly proportional to the time element.

Contact Corrosion

Placing other metals in contact with duralumin causes complications. The most violent corrosion is obtained by placing duralumin in contact with copper or any of its alloys in a salt atmosphere. The copper alloy seems to be affected very little, if at all, whereas the duralumin disintegrates completely in a relatively short time. The corrosion that takes place in case of steel and duralumin contact is not as violent as in the case of copper and duralumin, which is fortunate in a way since most installations do require a combination of high strength alloy steel with duralumin.

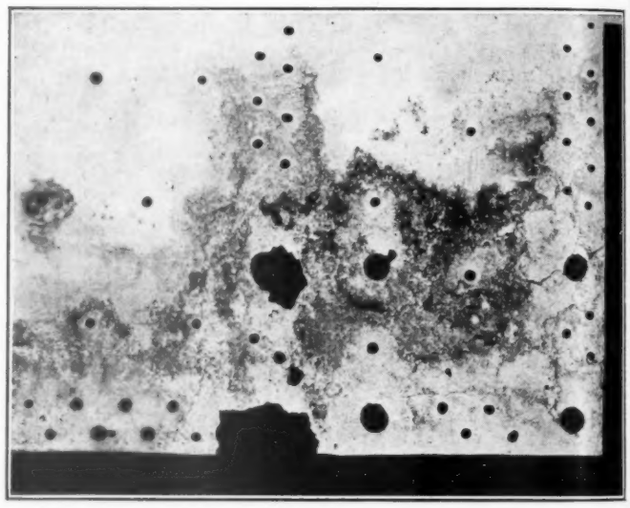
Steel and iron rivets placed in a duralumin structure and subjected to a salt spray have resulted in localized attack to the duralumin in the vicinity of the rivets, and the rivets have rusted more than that ordinarily obtained. Another case worthy of note was where a steel casting on a duralumin sheet subjected to a salt atmosphere resulted in practically complete failure of the plate. The data on these combinations indicate that the amount of corrosion is dependent on the corroding medium and that the aluminum alloy will usually suffer in any medium which is active.

Galvanized steel placed in contact with duralumin in a corroding medium usually causes the galvanizing to soften up and break down. The duralumin on the other hand seems to maintain its original condition until the galvanizing has completely failed.

Aluminum is a strong electro-positive metal and it can be expected that aluminum alloys will corrode rapidly when placed in contact with other metals provided an electrolyte is furnished. This contact corrosion is particularly important when platings on duralumin are considered. Any break in the surface of a plating of a dissimilar metal causes very rapid action when the specimen is subjected to a corroding medium. That is one reason for the failure of platings as protective coatings on duralumin.

Induced Corrosion

In recent years a great deal of attention has been given in laboratories to inducing corrosion in metals. Duralumin is no exception and considerable data is available on the subject of duralumin in salt sprays and other mediums. These tests, in addition to giving data on duralumin, are also used to test the relative values of protective coatings and other special matters connected with corrosion.



Duralumin sheet in the wake of a steel forging after a short service at sea.

Duralumin can be tested by exposing it to the same elements to which it will be exposed in service, but the time taken to induce corrosion in this way is too long for ordinary use. Salt sprays, intermittent immersion in salt solutions and intermittent immersion in other mediums are the usual means for producing corrosion in a relatively short time and represent in a way what will happen to material exposed in service.

The spray and alternate immersion are approximately equally effective in producing corrosion The advantages of one over the other are centered on other factors.

Corroding Solutions

The corroding solutions used in spray and alternate immersion methods are:

(1) Sodium chloride solutions
(2) Calcium chloride solutions
(3) Sodium Chloride—Hydrogen Peroxide solutions
(4) Hydrogen Peroxide solutions

The losses in physical properties of duralumin corroded by induced corrosion are of importance. There are many factors that influence the rapidity of the action in the various solutions and various means used for inducing corrosion, and as a consequence the results obtained are applicable only to the particular investigations being performed.

The aluminum products of corrosion are exceedingly difficult to remove. Their removal is necessary for examination of specimens in the laboratory and for refinishing the surface in service. The laboratory method for removing products of cor-

rosion and salts consists of immersing the specimen in a weak solution of nitric acid until the surface appears relatively clean. This same method has been used in service where the size of the parts and the disassembly of the parts permitted it. As a rule, though, this method cannot be used in service because it requires disassembly. Other procedures are therefore necessary. Where the corrosion is scattered over flat surfaces, the use of a putty knife or equivalent is believed to be as effective as any means known. Over rivet heads and similar irregular surfaces wire brushing produces the best results. After scraping or brushing the dust left should be blown off or wiped off with a dry rag. Efforts have been made to find a more satisfactory way to clean corroded duralumin but without material success. Water and most of the usual liquid chemicals aggravate the condition rather than assist the project. Pickling in nitric acid, scraping, and brushing must be relied upon to produce as good results as can be expected.

Conclusion

It appears that all duralumin will corrode to some extent in service if left unprotected. The difference in the amounts of corrosion under various circumstances is not great enough to warrant the omission of any measure tending to reduce the susceptibility of the metal to corrosion in service. Salt water is the most common of the corroding media with which we have to contend in using duralumin in aircraft and ships. Due consideration to these factors during the design, construction and maintenance of these craft is necessary to get the maximum life.

[*Lieutenant Commander Nelson, who has been closely connected with the duralumin research and construction work at the Naval Aircraft Factory, will discuss, in a later article, the protection of duralumin and show how the corrosive disadvantages of this material are to be overcome in order that it may fill the important place it holds and is to continue holding in aircraft construction*—EDITOR.]

The Pan-American Flight

The Chilian Government having given full permission for the proposed flight of Air Corps fliers to pass over its territory, everything is now being put in readiness for the start of the five Loening Amphibian planes to leave San Antonio, Tex. on or about Dec. 15 for South America. The distance to be covered is approximately 18,524 miles.

The tour, according to Dwight F. Davis, Secretary of War, is for the purpose of taking a message of good will from the United States to its southern neighbors, giving the citizens and officials of the countries the opportunity of inspecting the airplanes and equipment and also as a training for personnel in the Air Corps.

Ten officers of the United States Army Air Corps will make the flight. Maj. Herbert A. Dargue has been appointed flight commander, and the other officers selected for the flight are Capts. Arthur B. McDaniel, Ira C. Eaker, and Clinton F. Woolsey, and First Lieuts. Bernard S. Thompson, Leonard D. Weddington, Charles McK. Robinson, Muir S. Fairchild, Ennis C. Whitehead, and John W. Benton.

Leaving San Antonio, Tex., the squadron will follow the East coast of Mexico to Puerto, Mex., cross the Isthmus of Salina Cruz, and thence to the Air Corps station in the Canal Zone. From Colon, the route follows the West coast of South America to Valdivi, in Chile, where the fliers will turn due East and cross the continent to Bahai Blanca on the Atlantic coast of Argentina.

From Buenos Aires, a 700 mile trip up the Parana River into the interior will enable the flight to visit Asuncion, the capital of Paraguay. Doubling back by the same route to Montevideo, the airplanes will again follow the coast line northward visiting in turn Brazil, the Guianas and Venezuela.

At Trinidad the route leaves the mainland of South America and a series of interisland hops through the Lesser Antiles, Porto Rico, the Dominican Republic, Haiti, and Cuba will bring the fliers to Miami, Fla. With Washington as the final destination, stops will be made on the last leg of the journey at Jacksonville, Savannah, Wilmington and at Langley Field, Va.

With an extra fuel tank provided for the South American journey, the Loening Amphibians will be capable of continuous flight for nearly 10 hr. This will give them, at 100 m.p.h., a cruising range of approximately 1000 miles. As arranged now, the longest single hop, that between Neuguen and Bahia Blanca, in crossing South America from Chile to Argentina, is only 565 miles.

The entire flight has been divided into six divisions, and for each of these an officer has been appointed to precede the flight and to make all necessary ground arrangements. The first division of the flight is from San Antonio to Panama; the second from Panama to Valdivia in Chile; the third from Valdivia to Rio de Janeiro; the fourth from Rio de Janerio to Port of Spain in Trinidad; the fifth from Trinidad to St. Thomas in the Virgin Island. The sixth division covers the remainder of the flight to Washington.

Spanish-American Aeronautical Congress

Information has just been received that a Spanish-American Congress opened on Oct. 20, in Madrid. The program of the Congress included the adoption of terminology in Spanish and French, study and recommendation on international aerial legislation, from the standpoint of Spanish-American interest, with proposed modifications to the existing international conventions for aerial navigation, and international private aerial rights.

It was planned that the Congress would visit all of the Spanish factories and flying fields during the four days of the Congress. Don Juan Francisco de Cardenas, chief of the American Section, in the Ministry of State, was made president of the organizing committee. The entire organization was governmental, as practically all members of the commission were either military or civil authorities of the present Ministry.

Aviation to Figure in Florida Exposition

The week of Nov. 22 to 27 has been designated as Progress Week, at which time the Chambers of Commerce of Coral Gables and Miami will hold an exposition at the former city. Aviation will be given a prominent place at the exposition and it is the desire of the committee in charge to have as many aircraft manufacturers as possible exhibit their very latest models, from the smallest type of plane to the large passenger carrying type.

The airplane exhibit will be handled by Capt. J. B. French, local manager for the Florida Airways Corp., which now flies planes from Miami to Tampa and Jacksonville and which will inaugurate the Miami-Havana line Dec. 1. An excellent landing field will be ready for the use of visiting planes during the exposition and space allotment, publicity and advertising will be free to the manufacturers entering their planes.

An attendance of 200,000 is expected and there is little doubt that it will do a great deal in fostering public interest in aviation in southern Florida.

German Civil Aviation Appropriations

Appropriations in the German Federal budget for 1926 in behalf of commercial aviation total 27,100,000 reichmarks. The largest item, amounting to 8,370,000 reichmarks, concerns direct subsidies from Government to operating concern at the rate of about 2 marks per kilometer. The item next in size, amounting to 5,300,000 marks, concerns scientific research. Contributions by States, municipalities, and chambers of commerce, which are considerable and which commonly deal with such matters as groundwork, survey and patrol work, new installations, landing fields and terminals, are not included in the budget.

One of the best services in German aviation is that dealing with weather reports, meteorological observations, the study of wind currents, etc. A daily weather map is prepared for the guidance of pilots by means of which they know the approximate height of clouds, location of storm centers, movement of fog banks, etc.

The British Lightplane Competition

Economy in Fuel Consumption is Basis for 1926 Tests. Engines Limited to 170 lb.

IT HAS not been possible before this time to give an authentic account of the results of the very interesting lightplane competitions which were held in England recently but as the details of this meet, which was held at Lympne (on the Southeast coast of England), are of interest to AVIATION readers more from the standpoint of indicating what can be done with the low powered airplane than from their current news value, it is thought that it will not be too late to give space to these events.

The major part of the Lympne meet was the efficiency competition for £5000 ($25,000) in prizes, the first prize being £3000, offered by the Daily Mail, (London), and held Sept. 10-17. In addition, there were three handicap races for lightplanes scheduled for Sept. 18, namely, the Society of Motor Manufacturers and Traders Handicap, the Lympne Handicap and the Grosvenor Cup race, which is an annual event.

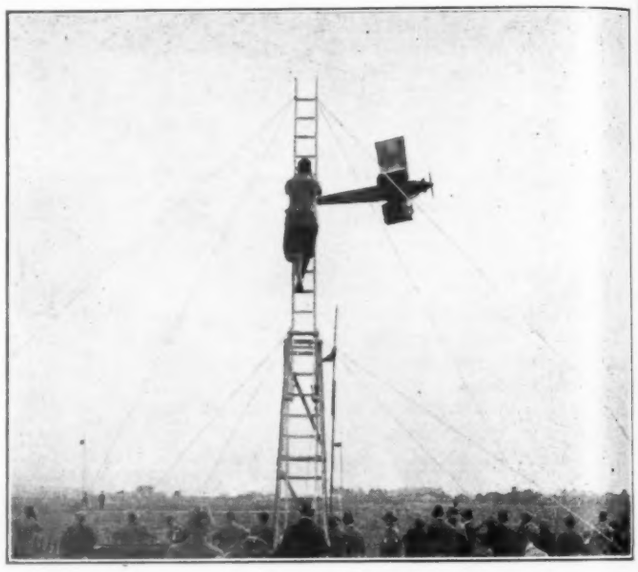
Fuel Consumption Paramount

The Daily Mail competition was judged on a basis of useful load carried by planes per unit of fuel consumed during the period of the contest when approximately 2,000 miles were covered over scheduled routes each day. The rules permitted the entry of any airplane the weight of the engine of which was not over 170 lbs. This weight limit included carburetor, induction system, ignition equipment, propeller hub and fittings, exhaust pipes and radiator, pipes and water, if any. It so happened that every entry was fitted with an air-cooled engine. The machines had to be two-seaters with dual control, an airspeed indicator being visible from each seat and capable of accommodating a normal 6 ft. person. Furthermore, a cockpit width of not less than 24 in. at the level of the seat was the regulation in the case of both the pilot's and the passenger's cockpit, this measurement becoming 44 in. in the case of a side-by-side two-seater machine; only one of which type appeared, however. The useful load had to be a minimum of 340 lbs. including the weight of pilot and passenger (if no passenger, ballast to the total of 340 lbs. was carried). Additional useful load to the amount prescribed by the Airworthiness Certificate was permitted to be carried anywhere in the machine. Certain repairs and replacements during the competition were allowed, the latter consisting mainly of small engine and airplane parts. Entrants were permitted to replace a complete ignition system if necessary, which appears to be a weak point in this section of the rules for if, in a competition, one is permitted to replace the ignition system, there would seem little reason for not permitting complete new engines to be fitted if necessary since the ignition system is such a vital part of an internal combustion engine. This point appeared to cause some controversy among the contestants as did many other features of the rules.

Elimination Tests

During the first two days of the meet, the airplanes had to be put through certain elimination tests classed under four headings. In the first of these, machines had to be folded up or dismantled and completely transported in one journey, without the aid of extra tackle, over a distance of 25 yds. and placed in a shed 10 ft. wide and 10 ft. high. Machines were then to be re-erected, the whole operation to occupy not more than an hour and to be carried out by no more than two men. Any special devices necessary to the operation had to be considered as part of the airplane and carried during all subsequent flights, but not as useful load.

The second elimination test consisted in a demonstration of the dual control, each machine making two short flights terminating in a figure-of-eight within the boundaries of the airdrome, the pilot, flying alone, to occupy alternately the two seats of the machine, thus proving that the plane could really be flown from either seat. The getting off test came third. Planes, starting from rest, had to take off in a straight line and pass two barriers 25 ft. high and placed 25 yds. apart, the first one being 300 yds. from the starting point. This test assumed a head wind of 6 m.p.h. In the final test, that for landing, planes had to make a straight landing over a barrier 6 ft. high and come to rest within 125 yds., this also assuming a 6 m.p.h. head wind. Any form of air-brake could be employed provided it was carried throughout



The Avro Avian being observed in the getting off elimination tests at Lympne.

the competition. In the case of a failure to carry out any of the tests with the load anticipated, this could be reduced to not less than the minimum of 340 lbs., the final load carried being, however, all that would be permitted in the competition itself.

The competition proper started on Sept. 12 and consisted of the planes covering a series of circuits connecting the main coastal towns, holiday resorts for the most part, of the South of England, the idea obviously being to interest the general public as much as possible in the little lightplanes. The average distance scheduled for each day was about 300 to 350 miles, totalling altogether 1,964 miles. The lengths of the circuits were arranged such that they were to be covered several times on any one day to make up the day's total, thus providing more than one visit at each turning point, although landings were made, except in emergencies, at Lympne only.

There were sixteen entries in the competition, three of which did not actually arrive, thus reducing the competing number to thirteen. Before the actual trials started, the A.N.E.C. Missel-Thrush, with the Blackburn Thrush three-cylinder radial engine of 35 hp., eliminated itself through nosing over when the stubs of the undercarriage struts stuck into the ground as the plane ran over a rather large bump. There is an interesting lesson here in being sure that the travel of the shock absorbers of a plane are not such that the tips of the undercarriage Vees can strike the ground when going over a big bump.

Three planes were turned down during the elimination trials, one of which was considered a satisfactory case whereas the rejection of the other two caused considerable dissatisfaction among the contestants. The first was the Short Satellite all-metal monoplane (Cherub engine) which failed to get

over the barriers in taking off. There was no argument over that. The other two planes were the Blackburn B'uebird (Genet, 60 hp. five-cylinder radial) and the Cranwell C.L.A.-4 (Cherub). Each was eliminated due to undercarriage trouble, the former bending a small lug and the latter bending a tube in the undercarriage which was known to have a flaw in it, there being no time to make the change before the trials. The authorities insisted that the change after the trials involved an infringement of the rules. Thus, the competition proper started with but nine planes taking part, one of which, the Supermarine Sparrow II, a high-winged monoplane, retiring during the first lap. By Wednesday, Sept. 15, four other machines had been disqualified, namely, the Avro Avis (Genet engine), the Westland Woodpigeon (A.B.C. Scorpion, 37 hp. twin-cylinder engine), the Avro Avian (Genet engine), and the DH Moth (Genet engine). Each of these disqualifications was for comparatively minor trouble, in most cases sheer bad luck.

The Formula

As already stated, the winner of the competition was to be determined on the basis of the ratio of useful load carried to fuel consumed and for this purpose the following formula was used for obtaining the "figure of merit":

$$\text{Figure of Merit} = \frac{\text{Lb. Useful Load} \times \text{Miles Flown}}{\text{Lb. Fuel Used}}$$

The results of the Competition are summarized in the table below:

NO.	AIRPLANE	ENGINE	WEIGHTS: PLANE EMPTY LB.	WEIGHTS: PLANE LOADED LB.	WEIGHTS: USEFUL LOAD LB.	TOTAL MILEAGE	FUEL USED LB.	FIGURE OF MERIT	OVERALL AVERAGE SPEED M.P.H.	RESULTS
1	Blackburn Bluebird	Armstrong—Siddeley Genet	—	—	—	—	—	—	—	Eliminated
2	de Havilland Moth	Armstrong—Siddeley Genet	734¾	1550	700¾	1286	592.23	(1641)	(55.84)	Disqualified
3	Bristol Brownie	Bristol Cherub III	623	1000	340	1994	402.09	1687	59.71	3rd.
4	Hawker Cygnet	Bristol Cherub III	430	850	340	1994	398.88	1808	55.68	2nd.
5	R.A.E. Sirocco	Bristol Cherub III	—	—	—	—	—	—	—	Did not compete
6	Hawker Cygnet	Bristol Cherub III	420	900	429	1994	388.83	2203	64.98	1st.
7	Supermarine Sparrow II	Bristol Cherub III	—	—	—	—	—	—	—	Retired
8	H.A.C.1	Bristol Cherub III	—	—	—	—	—	—	—	Did not compete
9	Avro Avian	Armstrong—Siddeley Genet	695	1600	827½	1282	507	(2092)	(72.71)	Disqualified
10	Avro Avis	Blackburne Thrush	609	1000	340¼	508	108	(1600)	—	Disqualified
11	C.L.A. IV	"P" Engine	—	—	—	—	—	—	—	Did not compete
12	C.L.A. IV	Bristol Cherub III	—	—	—	—	—	—	—	Eliminated
13	A.N.E.C. Misselthrush	Blackburne Thrush	—	—	—	—	—	—	—	Did not compete
14	Pemall Pixie III	Bristol Cherub III	523	924	340	1994	439.87	1541	58.94	4th.
15	Short Satellite	A.B.C. Scorpion II	—	—	—	—	—	—	—	Eliminated
16	Westland Woodpigeon	A.B.C. Scorpion II	569	985	346½	1008	334	(1046)	(48.73)	Disqualified

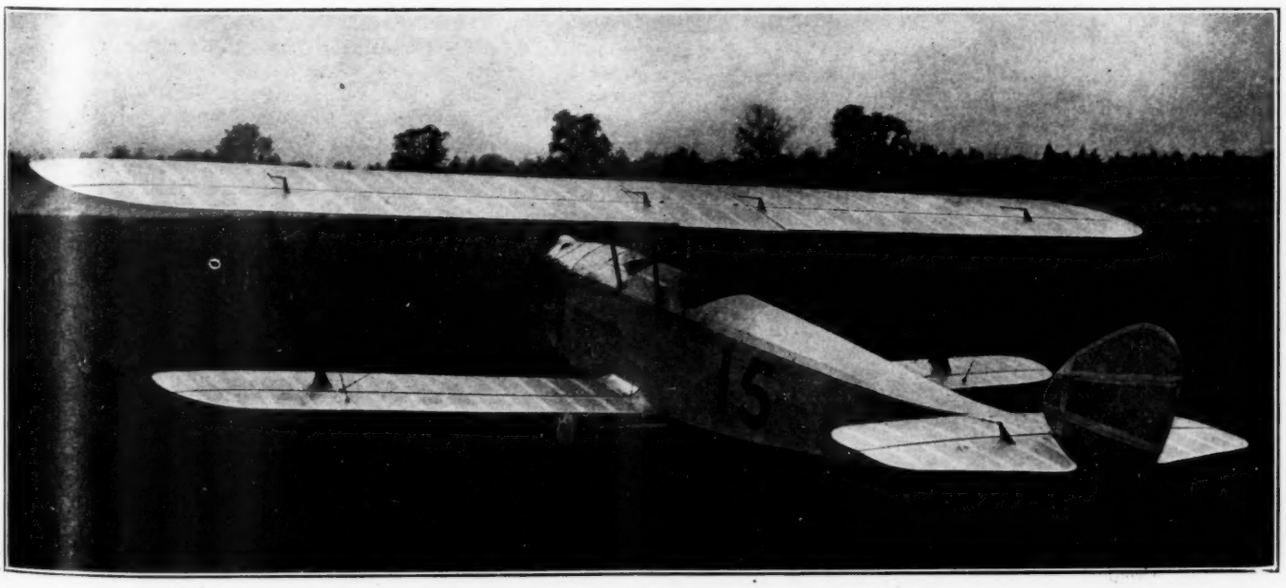
The Lightplanes in the Lympne Competition

Six New Designs Among the Fifteen Entrants

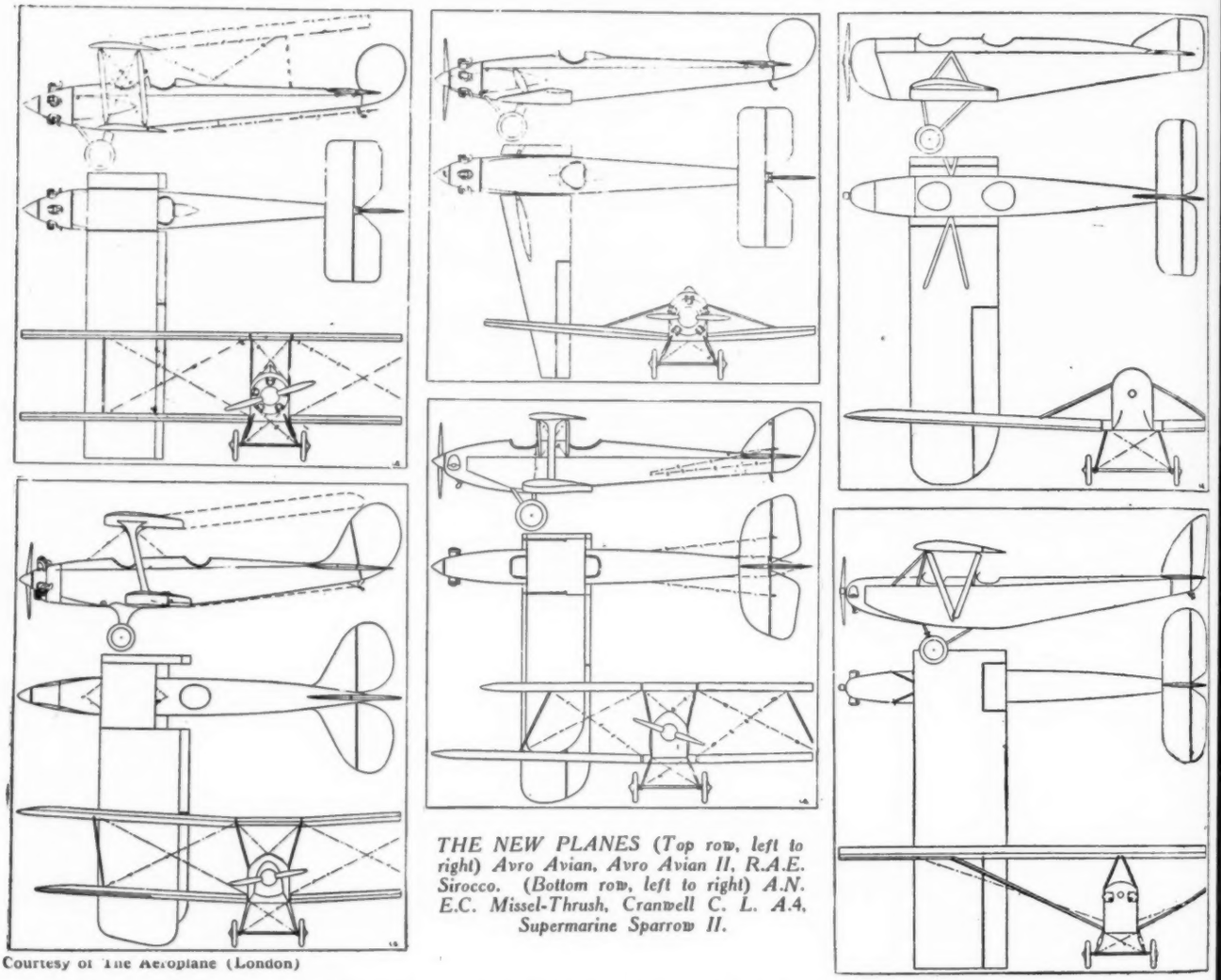
OF THE fifteen types of lightplanes which were entered in the Lympne (England) competition recently, six were of new design and have not, therefore, been previously described in AVIATION. The other machines appeared during the 1924 lightplane competition held at Lympne. (There was no competition last year). In addition, one other new machine, the Avro Avian II, entered in the Grosvenor Cup handicap race but did not take part in the competition. It is proposed to give a very brief description of each of the competing planes commencing with the new designs. All the planes, of course, are two-seaters.

The A. N. E. C. Missel-Thrush

Produced by the Air Navigation and Engineering Co., the Missel-Thrush is a biplane equipped with a Blackburn Thrush three-cylinder radial engine of 30 hp. The fuselage is of wood covered with three-ply and tapers in section from a more or less rectangular shape at the pilot's cockpit to an inverted triangular section at the tail. Between the cockpits there is



The Hawker Cygnet (Bristol Cherub III, 34 hp.), winner of the competition.



THE NEW PLANES (Top row, left to right) Avro Avian, Avro Avian II, R.A.E. Sirocco. (Bottom row, left to right) A.N. E.C. Missel-Thrush, Cranwell C. L. A.4, Supermarine Sparrow II.

Courtesy of The Aeroplane (London)

a locker with ample room for two suit cases and another space above this, in the fairing provides room for smaller luggage. There is a fireproof bulkhead immediately behind the engine. The wings are of thin section built with spruce and plywood box spars and spruce and three-ply ribs and fabric covered. A single interplane strut of I shape on each side of the fuselage and wire bracing completes the wing structure. The lower wings are attached to the fuselage at a pair of stub roots built into the body, while a center section supported on two I struts is provided in the top wing structure. The wings hinge about the rear spars and may be folded by one man in a few minutes. The tail construction is similar to that of the wings. The undercarriage is of the normal Vee type employing steel tube members and the whole faired in with plywood. The gasoline tank is situated in the fairing ahead of the front cockpit, which is usually occupied by the pilot, and contains 6 gal. fed by gravity. The general details are as follows:

Span (top wing)	28 ft.
Span (bottom wing)	26 ft.
Chord (top)	4 ft. 6 in.
Chord (bottom)	3 ft. 9 in.
Wing area	210 sq. ft.
Length	21 ft. 6 in.
Height	8 ft.
Weight empty	480 lb.
Max. designed load (including pilot, passenger, etc.)	570 lb.
Wing loading	5 lb./sq. ft.
Power loading	30 lb./hp.
Max. speed (estimated)	80 m.p.h.

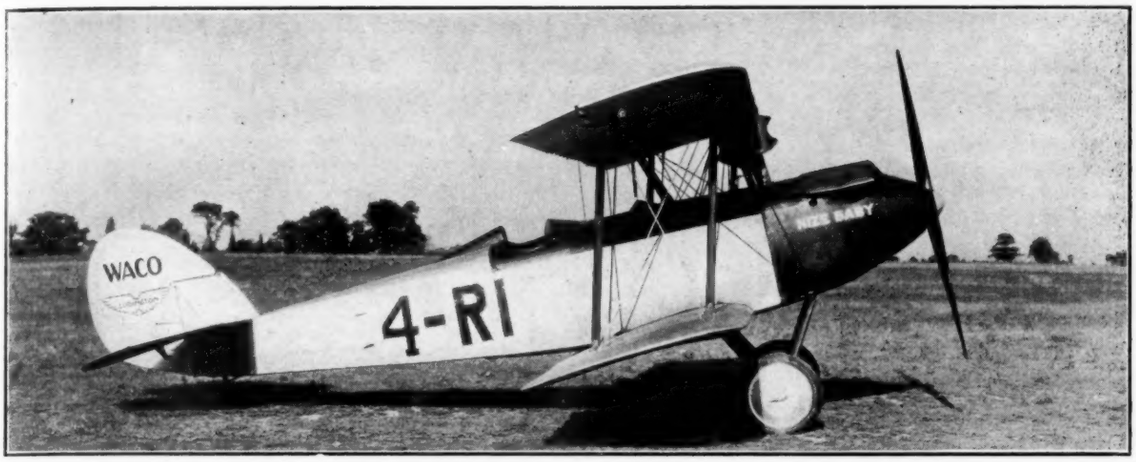
The Avro Avian

The Avian is a new plane produced by A. V. Roe and Co. It is a conventional single bay biplane with a very well streamlined fuselage of normal wood construction covered with three-ply. The engine is the new Armstrong Siddeley Genet five-cylinder radial of 66 hp. which is very well faired in under a circular cowling which merges gradually into the rectangular section of the fuselage. The engine is mounted upon a pyramidical box of riveted duralumin sheet bolted to the fireproof bulkhead. Fuel and oil tanks are situated under the fuselage fairing just behind the firewall. The two cockpits are in tandem, the pilot usually occupying the rear one. The undercarriage is of the normal Vee type. The wings are of thin section with square tips and are fitted with ailerons on the lower wings only. The upper attachment at the center is to a center section supported from the fuselage by a four strut cabane while the lower wings attach direct to the lower fuselage longerons. The wings hinge to the fuselage and center section at the rear spars and fold in the normal manner. The general details are as follows:

Span	32 ft.
Length	24 ft. 6 in.
Height	8 ft.
Wing area	294 sq. ft.
Weight empty (approx.)	750 lb.
Weight loaded (approx.)	1,550 lb.
Wing loading	5.27 lb./sq. ft.
Power loading	26 lb./hp.
Max. speed (approx.)	90—100 m.p.h.

The Avro Avian II

This plane is essentially a racing lightplane and did not compete in the Lympne competition but was entered in the Grosvenor Cup race. The fuselage is identical with that of the two-seater biplane machine with the front cockpit faired in and a set of monoplane wings fitted to the lower longeron. The wings are of thick, symmetrical R.A.F. 30 section sharply tapered in plan form and braced on each side by a single sloping strut from the top longeron. The engine is the Genet, 60 hp. The general details of the plane are:



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The Avro Avis with wings folded. In this picture the machine has a Cherub engine. In the competition, a three-cylinder Blackburn Thrush (30 hp.) was fitted.

Span	26 ft.
Length	24 ft. 6 in.
Height	5 ft. 11 in.
Wing area	75 sq. ft.

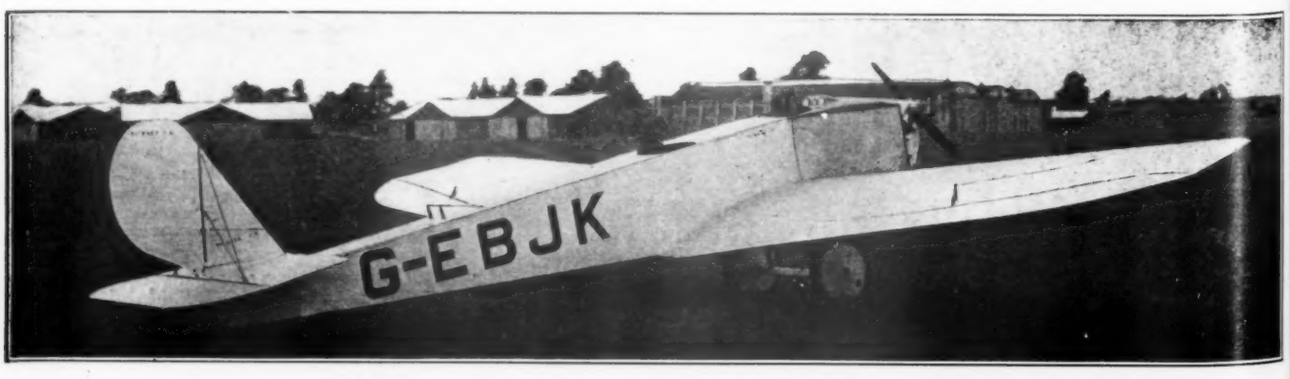
The Cranwell C. L. A. 4

Encouraged by their past successes in amature airplane design and construction the Cranwell Aero Club of the R.A.F. School at Cranwell produced the C.L.A. 4 biplane for the Lympne competition. Two planes were built identical in every detail except that the engine of one was to have been the Cranwell Popjoy which, however, had not completed its type tests in time. The Bristol Cherub engined plane was, therefore, the only representative of this very active aero club to compete at Lympne. The most noticeable feature of the C.L.A. 4 is the fact that the upper wing span is considerably shorter than the lower span. The fuselage is of wood frame construction rectangular in section and faired. It is wire braced from the engine mounting to the back of the rear cockpit and rigid diagonal bracing is employed thereafter. The wings are of thick section similar to R.A.F. 31 and are hinged at their rear spars for folding. The upper wings attach to a normal center section supported on four struts while the lower wings attach to wing roots built into the fuselage. The interplane bracing is by means of two single I struts on each side sloping upwards and inwards. Wire bracing is employed. Ailerons are on the lower wings only. The general dimensions are as follows:

Span (top)	22 ft.
Span (bottom)	17 ft. 4 in.
Chord (top)	3 ft. 4 in.
Chord (bottom)	4 ft.
Length	22 ft. 3½ in.
Height	6 ft. 7½ in.
Wing area	164 sq. ft.
Weight empty	450 lb.
Weight loaded	860 lb.
Wing loading (Cherub, 34 b.hp.)	5.2 lb./sq. ft.
Power loading (Cherub, 34 b.hp.)	25 lb./hp.

The Halton H. A. C. 1

This is another plane produced by an R.A.F. school. It was designed by the members of the educational staff of No. 1 School of Technical Training, R.A.F. and constructed under their supervision by the students at Halton Camp in the school workshops. The plane is a normal biplane with overhang on the upper wing. The fuselage of wood is constructed with four spruce longerons braced with diagonal struts over the forward section and covered with plywood. The upper side of the fuselage is faired. The engine, a Bristol Cherub III, is supported on a mounting of steel sheet. The lower wing is of smaller chord than that of the upper wing and it is staggered back so that its rear spar is vertically below the rear spar of top wing, thus facilitating arrangements for folding. The wings are of wood construction, the spars being glued spruce box structures and the ribs spruce girder type. The upper wing attaches to a center section which contains an eleven gallon gasoline tank. Ailerons, which extend from the center section to the wing tips, are fitted to the top wings only. The wings are wire braced with one interplane bay formed of a single X-shaped strut on each side. It will be noticed from the drawings that the rudder is balanced. The undercarriage is formed of the normal Vees of steel tube and is rubber sprung with an undivided axle. Incidentally, the plane is fitted with a Fairey-Reed duralumin propeller. This plane was not completed in time to take part in the Lympne competitions. The general details are as follows:



The Bristol Brownie (Bristol Cherub III, 34 hp.) in its original form before the fuselage top fairing was added.

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The Blackburn Blue Bird. The engine in the competition plane was the Armstrong-Siddeley Genet, 60 hp.

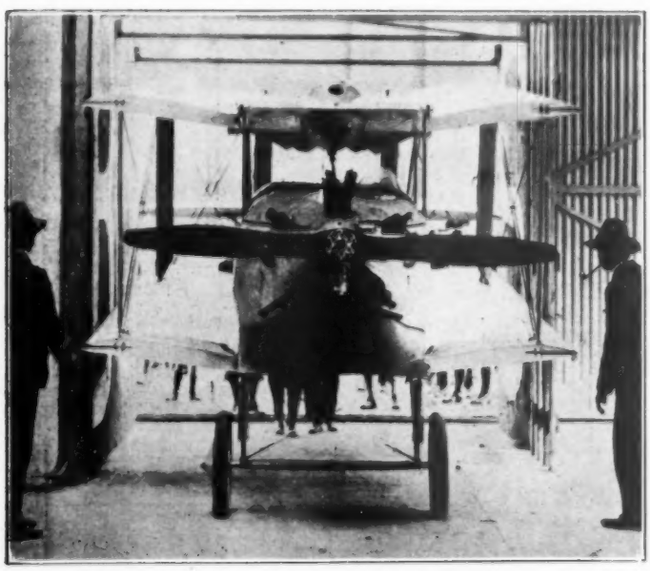
Span (top)	28 ft. 6 in.
Span (bottom)	20 ft.
Chord (top)	4 ft. 9 in.
Chord (bottom)	3 ft. 3 in.
Total wing area	195 sq. ft.
Weight loaded	880 lb.
Wing loading	4.5 lb./sq. ft.
Power loading (34 b.hp.)	25.8 lb./hp.
Max. speed (estimated)	76 m.p.h.
Min. speed (estimated)	36 m.p.h.

The R. A. E. Sirocco

This is a third amateur built plane, being designed and constructed by members of the Aero Club of the Royal Aircraft Establishment, one of the aircraft experimental and research establishments of the British Air Ministry. The Sirocco is a low-winged monoplane. It appears from the drawings to have a particularly large fuselage, with the result that the cylinders of the Bristol Cherub III engine are well faired at the nose of the machine. The fuselage is of wood construction being formed of four square spruce longerons braced by means of spruce struts attached with glued and screwed plywood gussets. The engine is carried on a very simple tubular mounting extending from the forward bulkhead. Gasoline and oil tanks are placed immediately behind this bulkhead. The gasoline tank holds 11½ gal.

The wings, of normal wood construction, are attached to stubs at the bottom fuselage longeron and are braced by Vee shaped struts extending from an apex on the top longeron to the front and rear wing spars at about one-third the semi-span from the body. The spars are of box section with spruce stringers and three-ply sides and taper in both width and depth from the root to the point where the bracing struts attach and again towards the wing tips, the thickest portion being at the point where the bracing struts are fixed. The wing section, however, does not taper and is of uniform Airscrew 4 section. The ribs are of spruce and drag struts are plywood-sided box girders with wire drag bracing. The wings do not fold but are easily detachable and fixed to the side of the fuselage for transportation over the ground. The tail unit construction is similar in essentials to that of the wings. The undercarriage is of steel tube construction and has a track of 5 ft. One very interesting feature of the construction of this machine is the fact that there are no spindled-out wooden members and few metal fittings, such as there are being of the simplest construction. The plane was built with very little shop facilities and is an interesting example of what can be done under such circumstances. It is an extremely robust job. The general details are:

Span	33 ft.
Length	21 ft.
Height	5 ft.
Wing area	159 sq. ft.
Weight empty (approx.)	595 lb.
Weight loaded (max.)	900 lb.
Wing loading	6 lb./sq. ft.
Power loading (34 b.hp.)	26 lb./hp.
Max. speed (estimated)	78 m.p.h.
Max. speed (estimated)	57 m.p.h.



Wide World Photo

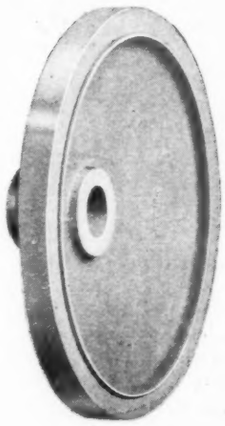
The Blackburn Blue Bird going through the 10 ft. door, in the elimination tests. Apparently, it only just went in.

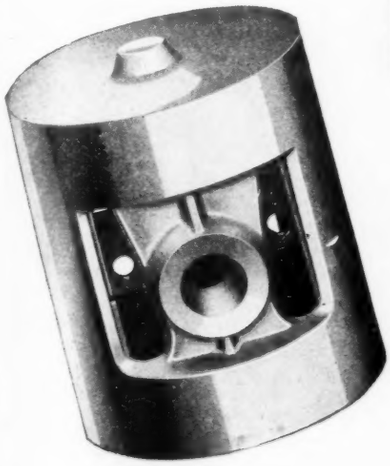
The Supermarine Sparrow II

This machine is only in part a new plane this year since the identical fuselage was used in the original Supermarine Sparrow biplane flown in 1924. This year's machine, however, is a high-wing monoplane and it was constructed as an experiment in the possibilities of carrying out full scale flight tests on actual wings to check on wind tunnel result. Consequently, the entrance of the machine in the Lympne competition was more of a sporting affair than any real intention of making a good showing. In view of the purpose to which the machine is being put, namely, that of full scale wing section testing, the wing is of purely rectangular section (probably of aspect ratio 6, though no details are available on this) with sharp unfinished corners and tips and raised well above the fuselage to be as free from interference as possible.

The fuselage is of wood construction, longerons being of spruce with a three-ply covering. The wing is a Clark Y section built in one piece and supported on the center line by a cabane of four steel tubes. It is braced by a Vee strut on each side from the lower longeron to the front and rear spars at about two-thirds the semi-span from the center. The undercarriage is of Vee type with a telescopic front leg. The

BOHNALITE PERMANENT MOLD CASTINGS





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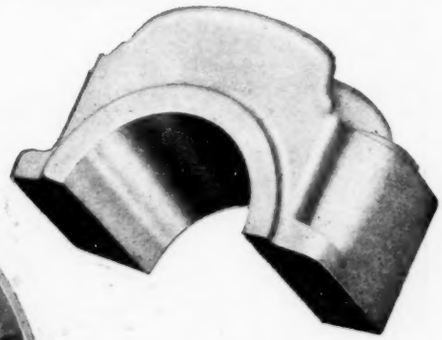


The Parnall Pixie III (Bristol Cherub III, 34 hp.)

engine is a Cherub III and, incidentally, a Fairey-Reed metal propeller is used. The general details are:

Span	34 ft.
Length	23 ft.
Height	7 ft. 5 in.
Wing area	192 sq. ft.
Weight empty	572 lb.
Max. weight loaded	1,000 lb.
Wing loading	5.2 lb./sq. ft.
Power loading	29.5 lb./hp.

This concludes the new planes which appeared at the Lympne lightplane competition. A few very brief details of the other planes which were entered will hereafter be given, although the majority of these have previously been described in AVIATION. The majority of them made their first appearance in the last Lympne competition, that was held in 1924.

The Avro Avis

This plane made its first appearance in 1924 and won the Grosvenor Handicap that year. It is a normal equal wing biplane having a single I interplane strut on each side. The undercarriage is of the normal Vee type with oleo shock absorbers in the rear legs. The engine originally was a Cherub but this year a Blackburn Thrush, 30 hp. three-cylinder engine is installed. The general details of the Avis are:

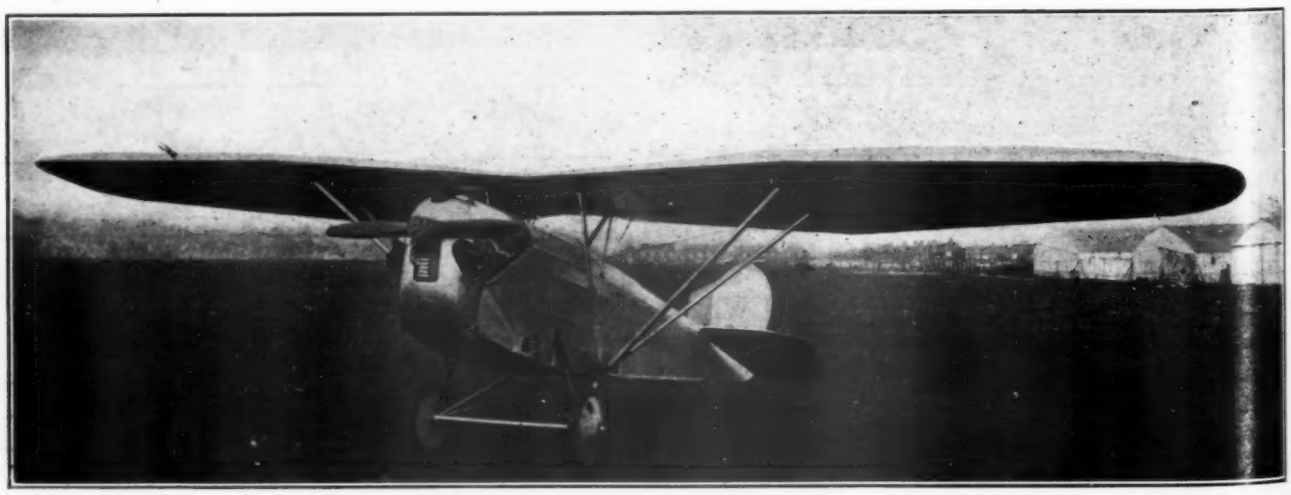
Span	30 ft.
Length	24 ft.
Wing area	255 sq. ft.

The Blackburn Bluebird

This machine, although built in 1924, did not take part in the competition that year so that in many respects this year's meet was its first public appearance. It is a side-by-side two-seater biplane with equal wings and a definite sweep back in plane form. The fuselage is exceptionally wide owing, of course, to the seating arrangement. It is constructed, from the nose to the rear cockpit, of box spruce and plywood and

The Parnall Pixie III (Cherub) with wings folded

steel frames with side-entrance doors. The after part of the fuselage is of spruce longerons rigidly braced with spruce struts with three-ply gusset plates. The wings, which hinge at the rear spar, are of normal spruce spar and rib construction. The interplane struts, a pair on each side, are of duralumin tube. The undercarriage is of the Vee type with a telescopic front leg and compression rubber shock absorbtion. An Armstrong-Siddeley Genet five-cylinder 60 hp. radial



The Westland Widgeon (Blackburn Thrush, 30 hp.). In the Grosvenor Cup race, in which this plane made fastest time (105.5 m.p.h.) an Armstrong-Siddeley Genet (60 hp.) engine was fitted.

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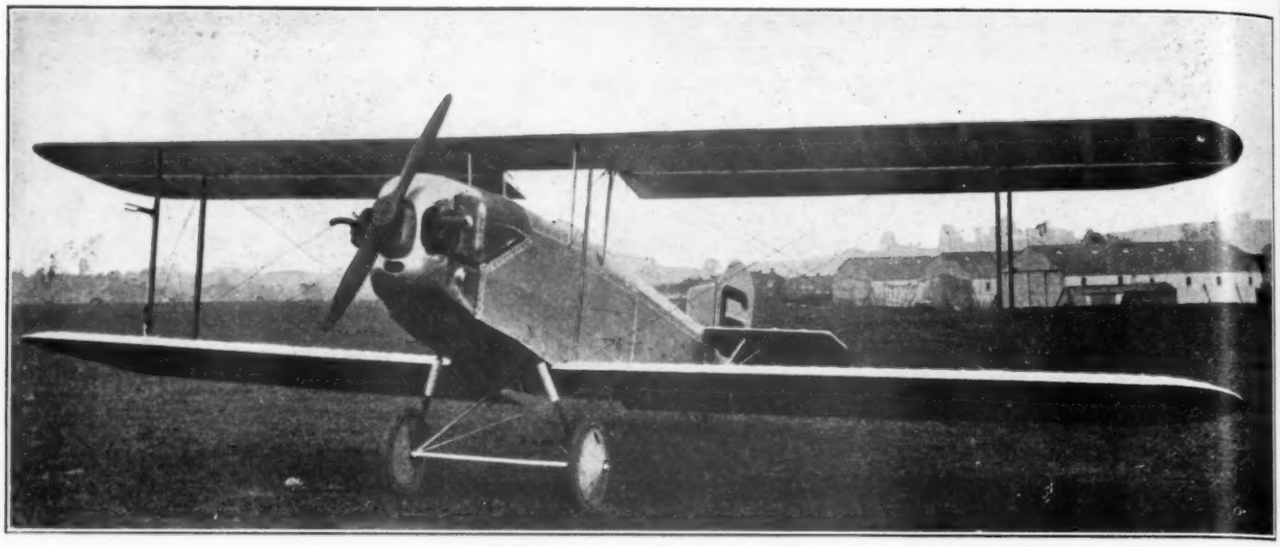


The Westland Woodpigeon (A.B.C. Scorpion II, 37 hp.)

air-cooled engine is installed. The general details are as follows:

Span	28 ft.
Length	21 ft. 8 in.
Height	7 ft. 11 in.
Wing area	243 sq. ft.
Wing loading	5.2 lb./sq. ft.
Weight loaded	1,250 lb.
Power loading (60 hp.)	20.8 lb./hp.
Max. speed (estimated)	75 m.p.h.
Landing speed	35 m.p.h.

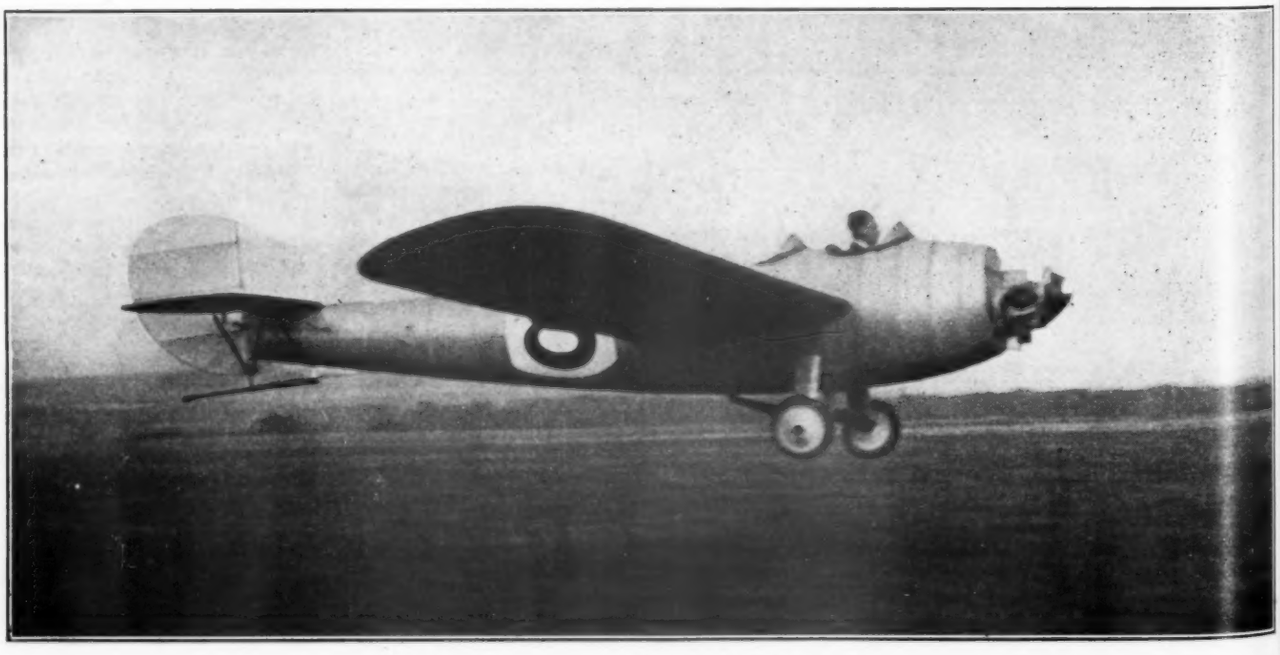
The Bristol Brownie

With the exception of certain minor modifications, the Bristol Brownie which appeared at Lympne this year was identical with the plane which was in the 1924 competition. The most noticeable change is the fitting of a fairing along the top of the fuselage which was not present in the first plane (as will be seen from the accompanying photograph of the plane which is a picture of the 1924 plane). The plane is of all-steel construction, the fuselage being a normal longeron and strut structure with swaged rod cross-bracing except in the forward part where wire bracing is employed. Longerons and struts are solid drawn steel tube. The wings are of thick section tapering in chord and thickness. The spars are corrugated high tensile steel strip longitudinals with steel tube diagonal members and the ribs are of duralumin. The plane is equipped with the Cherub III engine (34 hp.). The general details are:

Span	34 ft. 7 in.
Length	26 ft. 3 in.
Wing area	192 sq. ft.

The deHavilland Moth

The Moth is now a very well known machine since it has become the standard equipment of the British Lightplane clubs and is in very extensive use, but the 60 hp. Cirrus engine with which the standard machine is fitted was far too heavy to permit the plane entering in the Lympne competition which stipulated 170 lbs. as the maximum engine weight. Accordingly, a standard Moth was modified to take the Armstrong-Siddeley Genet 60 hp. engine. This engine, being much lighter than the Cirrus, is placed very much further forward in the fuselage, which somewhat alters the appearance of the plane. Unfortunately, it has not at this time



The Short Satellite (A.B.C. Scorpion II, 37 hp.)

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been possible to obtain a picture from England of the Genet Moth, but the photograph of the Cirrus plane gives the essential appearance of the plane which entered at Lympne. The fuselage is of normal wood construction with spruce longerons and struts and three-ply covering. The wings, too, are of wood construction with box spars and spruce and plywood ribs and fabric covered. Ailerons, fitted with the well-known deHavilland differential control, are fitted to the lower wings only. The wings hinge about the rear spars for folding. The undercarriage is of normal Vee type of steel tubes and has compressed rubber shock absorbtion. The gasoline tank is situated in the center section, this being considerably increased in depth to permit of sufficient capacity to the tank. The general details of the deHavilland Genet Moth are as follows:

Span	29 ft.
Length	23 ft. 6 in.
Height	8 ft. 7 in.
Wing area	225 ft.
Weight empty	720 lb.
Weight loaded	1,250 lb.
Wing loading	5.5 lb./sq. ft.
Power loading (60 hp.)	21 lb./hp.

The Hawker Cygnet

As will be remembered it was the Hawker Cygnets, two of which were entered in the Lympne competition, which took first and second prizes. Both these planes were constructed in 1924. The plane is a single-bay biplane with folding wings. The fuselage is of rectangular section and constructed of spruce longerons and diagonal spruce bracing struts. The engine is a Bristol Cherub III and is well cowled in and drives a Fairey-Reed propeller. The gasoline tank is situated under the fairing in front of the forward cockpit. The wings are of different chord and span, the upper wing being considerably larger than the lower. There is a center section for the attachment of the upper wing panels, while the wing bracing is formed with a single I interplane strut on each side and wires. Trailing edge wing flaps are fitted over the entire span of both upper and lower wings. These are operated as either ailerons, differentially, or as pure flaps for changing the wing section and thereby altering the lift. The general details of the plane are as follows:

Span	28 ft.
Length	20 ft. 5 in.
Wing area	165 sq. ft.

The Parnall Pixie III

The Parnall Pixie III appeared first in 1924 when it was a biplane, an extra wing having been added to the original monoplane design in order to comply with the requirements of the competition that year. This year, however, the Pixie III appeared as a monoplane in the form in which it was originally designed. The fuselage is a spruce structure with glued and screwed-on three-ply gussets for joints. At points where the stresses are high, such as where the wings attach to the fuselage, steel tubes are employed in place of the wooden members. The wings, which are fitted to the lower longeron, are braced by means of two inverted Vee struts from the top longeron of the fuselage down to the wing spars. The wings are of unusual plan form in that they commence to taper at a distance of approximately one-half the semi-span from the root, the trailing edge being swept forward. Ailerons constitute the swept forward portion of the trailing edge. The undercarriage is unusual in that the undivided axle is supported by only two single tubes which are completely unbraced. These undercarriage legs actually originate at the top longerons of the fuselage at the same point as that of the wing bracing struts. These undercarriage struts are also attached at the root of the front wing spars and then project down outside the fuselage. That portion of these legs which is outside the fuselage is telescopic and is equipped with steel springs and an oil dashpot, the fore and aft shocks in landing being taken in bending. The Parnall Pixie III is equipped with a Bristol Cherub III engine. The general details are:

Span	32 ft. 4 in.
Length	21 ft. 3 in.
Wing area	140 sq. ft.

The Shrot Satellite

This is nearly an all-metal monoplane lightplane with an all-duralumin fuselage of monocoque construction. The wings are of cantilever construction with wooden spars, duralumin ribs and fabric covered. Wing flaps extend over the entire span and serve both as ailerons and as camber-changing devices. The undercarriage is of the Vee type with the front legs attached below the front wing spar root and the rear legs extending backwards to the bottom of the fuselage. The axle is of hinged type attached also to the bottom of the body. The engine is a twin-cylinder horizontally opposed A.B.C. Scorpion II of 37 hp. The general details are:

Span	34 ft.
Length	23 ft. 9 in.
Wing area	168 sq. ft.
Weight loaded	1,060 lb.
Wing loading	6.4 lb./sq. ft.
Power loading (35 hp.)	30.2 lb./hp.

The Westland Woodpigeon

This is an equal wing biplane with dihedral and slight stagger and a single interplane bay. Wing flaps extend the entire length of the span of both wings and act as ailerons and camber-changing devices. The wings fold about the trailing spar. The fuselage is of wood construction, the longerons being of spruce with spruce struts and swaged rod bracing and fabric covering. The undercarriage is of Vee type with a telescopic front leg in which a friction damping device is fitted. The tailplane, which is of normal construction, is adjustable. The engine is an A.B.C. Scorpion of 37 hp. The general details are:

Span	27 ft.
Length	20 ft. 9 in.
Height	7 ft. 1 in.
Wing area	200 sq. ft.

The Westland Widgeon

The fuselage and tail unit of this plane are almost identical with the similar parts of the Westland Woodpigeon. The machine is, however, a monoplane with a high parasol type of semi-cantilever wing. The wing is supported at the center by a cabane of six struts and is braced at about one-third of the semi-span on each side by means of Vee struts extending upwards from a single point on the lower longeron of the fuselage to the front and rear wing spars. The wing is of peculiar plan from, the chord being small at the center line and widening out to the point of attachment of the bracing struts and then tapering steadily to the wing tips which are rounded. The section of the wing, likewise, is peculiar in that it is thin at the center line, becoming thicker gradually towards the bracing strut attachment, finally tapering off towards the wing tips. The wing is of Airscrew 4 section. From the aerodynamic standpoint, this arrangement probably gives a very efficient wing while it certainly has structural advantages. The Widgeon, which did not enter the Lympne competition, made the fastest speed in the Grosvenor Cup Handicap race, the figure being 105.5 m.p.h. although even this did not give it a place in the finish since it was evidently heavily handicapped. The engine now fitted is an Armstrong-Siddeley Genet. The general details are:

Span	30 ft. 8 in.
Length	20 ft.
Height	6 ft. 11 in.

New N.A.T. Mail Schedule

W. Irving Glover, Second Assistant Postmaster General, has announced a new flying schedule on contract air mail route No. 3. This route extends between Chicago and various points in the Southwest, to Dallas, Texas.

The new schedule was designed to give the fliers fifteen additional minutes of daylight flying, particularly in the vicinity of Moline, Ill. The new schedule, which becomes effective on Oct. 7, is as follows:

Leave Chicago 5:50 a. m., leave Moline 7:20 a. m., leave St. Joseph 10:20 a. m., leave Kansas City 11:18 a. m., leave Wichita 1:18 p. m., leave Oklahoma City 3:05 p. m., leave Fort Worth 5:15 p. m., arrive Dallas 5:35 p. m.

Leave Dallas 7:45 a. m., leave Fort Worth 8:15 a. m., leave Oklahoma City 10:10 a. m., leave Wichita 11:57 a. m., leave Kansas City 1:57 p. m., leave St. Joseph 2:40 p. m., leave Moline 5:15 p. m., arrive Chicago 7:20 p. m.

Starr Truscott Joins N.A.C.A.

Starr Truscott, who, since the creation of the Bureau of Aeronautics, in 1921, has been the assistant for lighter-than-air, left the department on Oct. 20. Fortunately for the aviation service, Mr. Truscott went to the National Advisory Committee on Aeronautics, where his technical skill and advice will still be available in an advisory capacity.

Starr Truscott

Recognized as possibly the foremost lighter-than-air engineer in this country, Mr. Truscott, as a designer of the Shenandoah, played a leading part in the construction of the first rigid airship built in the United States, and is a recognized authority on airship construction. He is an ardent advocate of lighter-than-air, and is expected to figure again prominently in the construction of the two new giant dirigibles authorized by Congress, for which appropriations have not yet been made.

The Proposed Naval Flight to Panama

On or about Nov. 19, when the moon will be full, two of the Navy's new PN-10 flying boats will leave Hampton Roads for the flight to Colon, Canal Zone, Panama, via Cuba. PN-10 seaplanes, Nos. A-7028 and A-7029, which have recently been completed at the Naval Aircraft Factory, will be employed, under the command of Lieut. Comdr. Harold T. Bartlett, U.S.N., who was recently appointed to take the place of the late Commander Rodgers, as commander of the long distance air patrol squadron. Commander Bartlett will be accompanied by Lieut. Herbert C. Rodd, radio officer and pilot; Lieut. Byron J. Connell, pilot; Lieut. Clarence H. Schildhauer; Lieut. Lawrence Curtin, pilot and navigator; Nelson M. Cooke, radioman, 1st class; and John Russell Roe, radioman, 1st class.

The distance of the flight will be 1,789 nautical miles. It will be remembered that the distance traveled by the PN-9 under the command of Commander Rodgers in the Hawaiian flight of last year was 1,670 miles.

The detailed route of the flight is as follows (distance in nautical miles): Hampton Roads to Cape Hatteras, 111; Cape Hatteras to Miami, 618; Miami to Alligator Key, 58; Alligator Key to Mariel, Cuba, 163; Mariel, Cuba, to Isle of Pines, 79; Isle of Pines to Old Providence Island, 505; and Old Providence Island to Colon, 255.

The PN-10 is a twin-engine flying boat equipped with two 500 hp. Packard geared engines mounted between the biplane wings as tractors. Each engine drives a three-bladed Standard Steel propeller. The wings are of equal span, measuring 67 ft. 2 in. They are of duralumin construction fabric covered. The hull, which is also of duralumin construction throughout is 45 ft. long and 10 ft. maximum beam and 7 ft. maximum height. The entire length of the hull inside is packed with equipment and ten gasoline tanks, with the exception of a walkway down the middle. Two 40-gal. gasoline tanks are situated in the upper wing while two more, of 25 gal. capacity each are situated under the seat in the cockpits and one under the floor in the pilot's cockpit.

The following brief details of the PN-10 are available:

Span	67 ft. 2 in.
Length of hull	45 ft.
Max. beam of hull	10 ft.
Max. height of hull	7 ft.
Weight empty	10,000 lb.
Weight loaded	21,000 lb.
Weight of gasoline	9,000 lb.
Weight of crew and equipment	2,000 lb.
Radius	2,400 miles
Speed, max.	114 m.p.h.
Speed, min.	64.3 m.p.h.

For transmitting purposes, the PN-10's are equipped with Bureau of Engineering type 100-watt tube alternating current transmitters, which have a daylight range of from 250 to 400 miles over water and which have been heard up to 600 miles in daylight. The transmitters operate on frequencies between 600 and 285 kilocycles (500-1050 meters). The 50-watt vacuum tubes are used and power is supplied by the conventional wind-driven generator.

For emergency transmission each plane is equipped with a high frequency 7,500-kilocycle (40 meter) crystal-controlled transmitter which will enable the planes to send while on the water without power from the engines. The power for this emergency transmitter is obtained from a lightweight, hand-operated generator which furnishes both filament and plate current for a single 7.5 watt vacuum tube. This set uses a single wire antenna about 30 to 35 ft. long, which may be rigged easily on the plane.

In addition to the high frequency, emergency transmitter, provision is made for mounting the wind-driven generator in the propeller stream of either of the two engines in case of a forced landing due to one disabled engine. The antenna for this transmission system is a 300-ft. single wire and will be carried by a King kite.

Air Mail Service for Mexico

According to reports, a ten year contract between the Mexican Government and the Compania Mexicana de Aviacion, whereby an air mail express and passenger service is to be established between Mexico City, Tampico and Tuxpam, with an "irregular" service between Cuidad Victoria, Tampico and Tuxpam has been signed. The details have been received from the Fairchild Aviation Corp., parent organization of the Mexican operating company.

Mexico has inaugurated a new policy of fostering commercial aviation with the idea of building up a potentially strong national air defense. Equipment will probably consist of Fairchild FC-1 monop cabin monoplanes to be powered with Fairchild Caminez 150 hp. or Wright Whirlwind 200 hp. air-cooled engines.

The concession embodies several unusual features, one of which provides tax exemption and the free use of available government owned lands for airdromes, but the rates that may be charged are prescribed in the contract, and the aviation company has been required to deposit $11,650 in the Bank of Mexico as a guarantee of the fulfillment of all obligations assumed.

The company also is required to contribute a certain percentage of its earnings to a fund for regular inspection by government experts of this aerial transportation equipment.

According to the report, full radio rights have been awarded to the Mexican aviation company for the routes involved, and the Mexican government guarantees that no other commercial air service will be allowed to operate between the points allotted to this organization. There is one exception to this ruling, however. Other companies will be permitted by the government to use the Mexican aviation company's routes, landing field, etc., if they turn over to that organization 50% of their tariffs. All airdrome facilities will be accessible to

military airplanes, and officials of the government must be carried at 10 per cent discount from regular rates.

Under the terms of this contract passengers must be carried at 40 cents a kilometre (a kilometre is ⅝ of a mile, and all money references are in Mexican currency) for the first 400 km. and 30 cents a kilometre for the next 400 km. On special trips or irregular service with a minimum distance of 100 km. the rate will be double the regular service charged, and as many tickets must be paid for as there are seats for passengers in the plane.

The company is not obliged to accept less than a $20 fare from any passenger regardless of the distance he may be carried. Half fare is to be charged for children from 3 to 10 years; nothing for those under 3 years of age. Twenty kilograms (about 44 lb.) of baggage are allowed for each passenger free of charge, with a special price for excess baggage and a fee for transportation of valuable matter.

Arrangements are included for the carrying of first-class mail and a charge of $10 per gross kg. is allowed with the understanding, however, that the Post Office Department is not obliged to provide any given amount of air mail other than that the public may desire to send at the rate of 20 cents for each 20 gr. or fraction thereof.

Jack Laass to Fly for Travel Air

News has recently been received to the effect that Jack Laass, well-known as a flier of the Driggs lightplanes, has joined the Travel Air Manufacturing Corp. of Wichita, Kans. producers of the very excellent and extensively used Travel Air planes. He will perform, not only the duties of a flying salesman for the Travel Air Company, but will carry on the hundred-and-one other flying jobs which have previously occupied the time of Walter Beach, including air racing, etc. Walter Beach, who is vice-president of the Travel Air company, intends devoting all of his time in the future to managing the affairs of the company at its head offices and plant at Wichita.

That Jack Laass will prove a most valuable addition to the staff of the Travel Air Company, one of our foremost commercial aircraft manufacturers, there is no doubt. His ability as a pilot he has demonstrated time after time. His recent flying of the little Driggs Dart with the Wright-Morehouse engine in the Airplane Reliability Tour was but one of his many fine lightplane flights, in spite of the fact that he met with some measure of bad luck. Furthermore, it will be remembered that Mr. Laass flew the same little plane all the way from Dayton to Philadelphia for the National Air Races which entailed crossing the Alleghany Mountains. This flight undoubtedly must represent one of the most notable ever carried out in a lightplane either in this country and anywhere else in the World.

It is understood that Mr. Laass is shortly to leave in a Travel Air for the West Coast on a demonstration flight.

Los Angeles Flies to Detroit

The Los Angeles reached the Ford Airport, Dearborn, Mich., at 3:28 a. m., Oct. 15, in a flight from Lakehurst, N. J., which took slightly more than 16 hrs.

Weather conditions were generally good during the trip, which was the first inland flight of the airship. The Los Angeles left the naval airport at Lakehurst at 11:05 a. m., Oct. 14, maintaining a speed of more than 50 m.p.h. over Pennsylvania. It was piloted close to the ground over Ohio, owing to the danger of air pockets, descending at times as low as 1,500 ft. from the earth. It was necessary to take the ship off its course at times to avoid inclement weather.

The Los Angeles carried a crew of 44 men, together with Admiral Moffett and three passengers.

The thousands of people who had waited for hours for the arrival of the ship gathered at the inclosure and indulged in an ovation as it came into view. Lieutenant Z. W. Hicks, of the Lakehurst Airport, was in charge of the landing crew that received the Los Angeles. The landing tower, which is the newest of its type, was used for the second time when the Los Angeles was anchored to it.

British Air Transport

The Annual Report of Civil Aviation of the British Air Ministry has recently been published and contains much valuable information on both British civil aviation and that of other countries. To all those closely interested in commercial aviation it is a publication worth obtaining.

In the year which ended March 31, British aircraft engaged in civil aviation carried almost 15,000 passengers without a single loss of life and no serious accident. The mileage traveled by these aircraft amounted to 865,000, decrease of 25,000 miles from the figures for 1924-25. The decrease indicated more economical operation due to the use of larger aircraft.

Flying for hire or reward showed a remarkable increase, the number of passengers in this branch of aviation being 67,329, the largest on record. In the seven-year period since May, 1919, 67,227 passengers and 1,804.7 tons of cargo have been carried in air transport flying, and 315,102 passengers in flying for hire or reward. In the year under review British aircraft carried 11,363 passengers across the channel and foreign aircraft 10,391.

Combined imports and exports of general merchandise carried by both British and foreign aircraft also established a record. The figures are 1,972,072 lb. as against 1,326,395 lb. in the previous year.

Of 4,179 flights, 3,888, or 93 per cent, were uninterrupted, and a further 148 were completed on the same day without interruption. Involuntary landings on regular air transport services were attributable to weather in about 50 per cent of the cases, and to engine or installation failure in about 33 per cent.

Most of the landings caused by bad weather were due to poor visibility and should decrease with the installation of lights and other signalling devices along the air routes.

Great Britain has provisional air traffic agreements in force with Denmark, the Netherlands, Norway and Switzerland and investigations are being made with a view to concluding a provisional agreement with the German Government. These are over and above existing longstanding arrangements.

The report states that the full fleet of machines in use by Imperial Airways within the present summer is as follows, the figures in brackets denoting the seating capacity of each machine: Thirty-three Handley Page W. 8-B's (14); 1 W. 8-F (12); 1 W. 9 (14); 2 Armstrong-Whitworth "Argosys" (20); 4 W. 10's (14); 1 Vickers Vulcan (6); and 2 DeHavilland 50's (4). It is pointed out that as compared with last year the seating capacity of the company's fleet is increased from 119 to 178, the horsepower from 6,825 to 10,999 and the pay load from 23,000 to 37,000 pounds.

Four of the Imperial Airways DeH. 34 machines have each completed 300,000 miles in the air, while a Handley Page W. 8-B has completed 3,000 hours of flying.

French Airliners to Have Radio

The French Government has recently ordered that all commercial planes of that country be equipped with either wireless telephones or telegraph.

The apparatus with which each plane is equipped must be operated by a number of the crew other than the pilot and only by one who has a special license.

Hawaiian Flight a World Record

At the F.A.I. Conference, held in Rome, Italy, Oct. 10 to 16, the flight of Commander Rodgers and crew, between San Pablo Bay, San Francisco, and a point near the Hawaiian Islands, was recognized as a World record by that body. The record distance of 2963 km. (1841 miles) is the distance between San Pablo Bay, the point of start, and the S. S. Farragut, where observers last saw the PN-9 in flight.

The official record is as follows:

Distance (Airline) (United States) Comdr. John Rodgers, U.S.N., and Lieut. Byron Connell, PN-9 two Packard 1A-1500, 500 hp. ea. San Pablo Bay, Calif., to near Hawaii, Aug. 31-Sept. 1, 1925,	2963 km. 1841 Statute miles.

A PREDICTION REALIZED

The New Curtiss "FALCON"

DURING the past several months, the first group of Curtiss "Falcons" to be delivered to the Army have been undergoing service tests in the hands of Air Corps pilots. As was foreshadowed when the "Falcon" won first prize in the Observation Competition at McCook Field, this new observation airplane has rapidly gained favor with the flying personnel, who have found it much faster and more maneuverable than the present service type.

Powered with either the Curtiss D-12 or the Liberty motor; excellent from a maintenance standpoint; with a truly remarkable performance, the "Falcon" fulfills its advance indications of being the finest observation type in service today - a worthy "big brother" to the Curtiss "Hawk", the standard service pursuit plane of the U. S. Services.

FIRST - SECOND - FOURTH - FIFTH - *in the Liberty Engine Builders' Race for observation airplanes at the Philadelphia National Air Races.*

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Garden City, N. Y. and Buffalo, N. Y.

New World Records

The National Aeronautic Association has just received notice from the Federation Aeronautique Internationale that new World records for airplanes and seaplanes, established in accordance with F.A.I. regulations, have been recognized by that body as follows:

CLASS C^3—Seaplanes
With payload of 500 Kg. (1102.31 lb.)

SPEED for 100 Kilometers (France)
Lieutenant Demougeot, Villiers seaplane, Lorraine 450 hp., course Cape Camarat-Gulf Juan, May 13, 1926 — 203.275 k.p.h. / 126.309 m.p.h.

Former Record

SPEED for 100 km. (United States)
Lieut. George C. McDonald, U.S.A.S., Loening Amphibian COA-1, Inverted Liberty 400 hp. at Hampton Roads, Va., Jan. 23, 1926 — 179.497 k.p.h. / 111.534 m.p.h.

CLASS C—Airplanes
Without payload

DISTANCE (Airline) (France)
Capt. Ludovic Arrachart and Adjutant Arrachart, Potez Type 28, Renault 550 hp., LeBourget to Shaibah, near Bassorah, June 25-26, 1926 — 4305 km. / 2675 miles

DISTANCE (Airline) (France)
Captain Girier and Lieutenant Dordilly, Breguet 19, Hispano Suiza 500 hp., LeBourget to Omsk, Siberia, July 14-15, 1926 — 4715 km. / 2930 miles

Former Record

DISTANCE (Airline) (France)
Captain Arrachart and Lemaitre, Breguet 19 B-2, Renault 480 hp., Etampes to Cisneros, Feb. 3-4, 1925 — 3166.30 km. / 1987.26 miles

CLASS C—Airplanes
Without payload

ALTITUDE (France)
M. Callizo, Bleriot-Spad, Lorraine 450 hp. at Buc, Aug. 23, 1926 — 12442 m. / 40820 ft.

Former Record

ALTITUDE (France)
Callizo, Gourdou-Lesseure monoplane Hispano-Suiza 300 hp., Rateau Super, at Villacoublay, Oct. 10, 1924 — 12066 m. / 39586 ft.

CLASS C—Airplanes
With payload of 2000 Kg. (4409.24 lb.)

DURATION (France)
M. Robert Bajac, Bleriot, 4 engines Renault, 230 hp. at Buc, July 24, 1926 — 2 hr. 30 min. 37.2 sec.

Former Record

DURATION (France)
Lucien Bossoutrot, Super Goliath Farman, 4 Farman engines, 500 hp. ea. at LeBourget, Nov. 12, 1925 — 2 hr. 19 min. 16.4 sec.

The Schneider Cup Race

Major Guglielmetti, of the Genio Aeronautic Corporation, and Muzio Macchi, son of the manufacturer of the Italian planes, arrived in New York City Oct. 15 to make preparations for the International Seaplane Race for the Jacques Schneider Trophy, to be held at Norfolk, Va., Nov. 11. Their arrival was followed on Oct. 23 by that of Major Debernardi, Captain Arturo Ferrairin, Captain Girasconi and Lieutenant Baeula, of the Italian Air Force, the pilots who will represent Italy in the race.

M. Castoldi, engineer and designer for the Macchi Company, and Mr. Ferrotti, engineer for the Fiat Company, whose engines are used in the planes, with thirteen aviation riggers and mechanics, and the three racing seaplanes, which have been entered in the Schneider Cup Race to represent Italy, also reached the United States the same day.

A triangular course for the race has been laid from the southern end of the Newport News wharf to the northern end of the Naval Operating Base, Hampton Roads, then Northeast to a point 15.906 kilometers from the operating base, and back Southwest to Newport News wharf. The distance from Newport News to Hampton Roads is 10.073 kilometers. From Hampton Roads to the turning point it is 15.906 kilometers and the distance back to Newport News is 24.021 kilometers, making a total of 50 kilometers. There will be seven laps in this race, or a distance of 350 kilometers.

Three pilots and one alternate will represent the United States in the race. Lieut. George Cuddihy, U.S.N., Lieut. Frank H. Conant, U.S.N. and Lieut. Frank Schilt, U.S. Marine Corps, have been nominated as pilots by Lieut. Comdr. Homer C. Wick, U.S.N., who is in command of the team, and their selection has been approved by Admiral Moffett. Lieut. Carleton C. Champion, U.S.N., who, it will be remembered, flew the Wright Apache F3W-1 navy fighter with the Pratt and Whitney Wasp engine in the open pursuit plane race of the National Air Races recently, has been selected as alternate pilot.

The three machines which are to represent the United States in the race are the identical Curtiss racers which were

The pilots of the American team in the Schneider Cup Race. Left to right, Lieut. Frank H. Conant, U.S.N., Lieut. George Cuddihy, U.S.N., Lieut. Frank Schilt, U.S.M.C.

flown last year with comparatively minor alterations. Lieutenant Conant will fly the R3C-4 racer which is to be equipped with one of the new Curtiss V-1550 700 hp. direct drive engines, while Lieutenant Cuddihy, will pilot the R3C-3 racer which is being fitted at the Naval Aircraft Factory with a geared 1A-1500 special Parkard engine developing 700 hp. The third racer, to be flown by Lieutenant Schilt, will be the R3C-1 which won the Pulitzer and Schneider Cup races last year, equipped with a 600 hp. Curtiss V-1400 direct drive engine.

F. G. Erickson will, for the third time, be referee at this year's Schneider Cup race.

A New Junkers Airliner

The latest airplane constructed at the Junkers Works, in Germany, the G.-31, one of the largest aeroplanes in the world, was tested at Dessau recently.

This "Junkers Omnibus", as it is popularly called is a three-engined monoplane of the same general type as the G-23, hitherto the largest Junkers machine, but instead of ten passengers and a crew of two, it is built to carry 25 passengers and a crew of four. It is equipped with three 400 hp. Junkers L-5 engines.

The interior arrangements have not yet been settled: it is reported that in addition to providing comfortable sleeping accommodation it is proposed to divide the passenger section into a smoking compartment, a non-smoking compartment, and a ladies' compartment. More space has been provided for freight than in machines hitherto constructed. The first test flight, which was carried out by Herr Zimmermann, is said to have been satisfactory. The machine is being subjected to further tests.

Spain-Canary Islands Air Mail

An air mail service between Spain and the Canary Islands is being planned. Tenders will be received for this service up to Nov. 30, and sealed bids will be opened Dec. 2. The service will include at least one round trip weekly between Seville and Las Palmas and Santa Cruz de Tenerife. Only propositions from Spanish individuals will be considered, and in the latter case not only the management must be of Spanish nationality but 75 per cent of the capital must be owned by Spaniards. All flying personnel and 80 per cent of all other employees must be Spanish. The Government will pay a subsidy of 500,000 pesetas annually, and in exchange will exercise complete control over the enterprise.

Side Slips

By Robert R. Osborn

It seems that we may soon have to go right on and have assistant secretaries in charge of aviation for all of the departments. There appears to be work already for such an assistant in the Department of Agriculture. First, airplanes were used in dusting and spreading insecticides. Then we heard they were being used for broadcasting hay and grass seeds. Now we read that rice is being sowed by this method. Unless someone is vested with the authority to control these experiments, some farmer is going to try his hand at planting potatoes, sugar cane or onion sets from a thousand feet or more.

* * *

According to the newspapers' descriptions of it, the new flying machine invented by an Austrian inventor consists of a pair of motor-driven wings strapped to the back—giving the aviator quite an angelic appearance. Even if this device is not a success as a flying machine, if the inventor could give an "angelic appearance" to a few fliers we could name, he will have accomplished something. From our observations, we would say that some of the best pilots on this earth are the ones with the least chance of acquiring wings in the afterworld.

* * *

In an address before the Philadelphia Forum, Lieut. Comdr. R. E. Byrd admitted that he might have ambitions for flying to the South Pole also. If it is not too much to ask of him, we would like Commander Byrd to schedule his attempt at that Pole at a time when other aviation activities are at the lowest ebb. Some weeks it seems as if it will be almost impossible to fill the space of which we are the custodian. Sometimes it seems that not only nothing interesting, but nothing at all has happened in aeronautical circles. Another polar flight would certainly carry us through a couple of lean and hungry months.

* * *

One of the first tasks the new Aeronautics Branch, under the Assistant Secretary of Commerce, should undertake, is the accurate determination of the structural strengths of some of the repair materials available at the flying fields. We have had many inquiries regarding the strengths of the following materials, but as far as we know, no accurate data is available—soft iron stove bolts when used for wing hinge pins, hay wire and barbed wire for lift and landing wires, fence rails as interplane struts, landing wheels dished slightly, say forty-five degrees, out of track and fuselage members replaced by broom-sticks. It will really be impossible for some of the commercial operators to furnish the stress analyses required under the suggested air laws, unless they can have these materials investigated for them.

International Air Traffic Association Meeting

The sixteenth session of the International Air Traffic Association took place recently in Berlin, Germany. Representatives of 23 operating companies from 18 European countries were present. The United States was not officially represented.

A tentative draft for international aviation bills of ladings, drawn up by the German Luft-Hansa, was accepted in principle by the Association, subject to ratification by member companies.

Considerable progress was reported to have been made at the meeting in discussing and codifying stipulations concerning pilot permits, international statistical returns, and international freight insurance. Mention also was made of the desirability of establishing a coordinated European winter schedule.

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AIRPORTS AND AIRWAYS

Fort Worth, Tex.

By George F. Bischof

Aviation activity in this vicinity has been very quiet for some time, although with numerous fairs opening, there should be a chance for some business, either in passenger carrying or advertising stunts for the fair managements. Most of the stunt fliers who formerly wintered here are in the North and East. There seems to be a peculiar contrast in the flying for the past three years. In 1924 there were twenty-two planes flying around Fort Worth, in 1925 there were twelve and in the past year there have been only between five and nine planes and during that time the fliers claim poor business, although from observation there has been more cross country flying this year than in other years.

The Fort Worth Well & Machinery Co. sent a special shipment of machinery to South Texas, and for quickness of delivery the service could not be duplicated. This very fact will lead to competition in a manner that will help commercial business.

Air mail carrying is constantly increasing for the N. A. T., but little effort has been made to foster passenger carrying.

A. D. Hatch and Aubrey Connally have four planes to reconstruct, two of which are being fitted with high lift wings. Nearly all the wartime planes have undergone reconstruction.

Ross Arnold and Sam Ackers brought down a pellican uninjured Saturday, tiring him out until he landed. They placed him in a room and Sunday placed the bird on exhibition, at the same time staging an air circus.

Johnny Googin bought a new Jenny, Jack Clark had his Travel Air repainted and George Bischof recovered his ship and made an even wing level motor bed job out of it.

Boston, Mass.

By Daniel Rochford

The Army blimp TC-5 visited Boston Oct. 22-23, anchoring for the night at the airport. Forty enlisted men from Fort Banks served as landing crew. Lieutenant William Gray of the balloon service commanded the flight. The run from Mitchel to Boston took only three hours, due to favoring winds on the tail. Local interest ran high, this being the first visit of the sort to be made by an army balloon to Boston.

A new Consolidated training plane for the use of the Navy was flown from the airport the past week by Lieutenant Reginald D. Thomas, commander at Squantum. The plane drops very fast on landing and pilots accustomed to a plane which will float in find themselves forced to fly right onto the field before cutting the gun.

Staff Serg. George Schmidt, a reserve lieutenant, and the ranking non-com at the Boston Airport, serving as assistant to every commanding officer since the airport opened in 1923, has received orders for foreign service and sails for Hawaii with his wife and son Dec. 22 from New York. He will be at Luke Field under his old commander, Lieut. Robert J. Brown, Jr.

The Navy flew about forty hours last week. The army flyers totalled about twenty-six local hours and the National

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Guard Squadron added sixteen. Commercial flying totalled about ten hours excluding the daily flights of the air mail planes to New York.

Davenport, Ia.

By Ralph W. Cram

A very significant development, which will give Davenport another fine flying field, is the recent formation here of the Davenport Flying Club, which has leased Wallace Field and incorporated for the promotion of aviation.

The new flying club will have a limited membership, and already many of the live wires in business and social life are joining it. The following are the officers: Frederick E. Zeuch, president, Tom J. Korn, vice president, Robert L. Block, secretary and attorney, R. A. Moritz, treasurer. The Directors include the officers and also the following: Donald A. Luscombe, Ferdinand C. Zorn, Warren T. Zeuch, Burton E. Forrester, Frank C. Wallace and Robert Luscombe.

The club will do no commercial flying, but invites pilots to land at its field as soon as improvements can be completed. It will have a club house, filling station and emergency repair shop.

Schenectady, N. Y.

When C. C. Chesney decided to make an inspection of the Pittsfield plant of the General Electric Company recently he did so by the most modern method. Feeling that a view from the air would be an efficient manner for checking up on certain details, Mr. Chesney hired an airplane and was able to complete the work in a short time.

Evansville, Ind.

Garrison Airport has been the scene of much activity recently. It is located at the edge of the city limits, on the North side, and at the junction of the two main highways leading North and East from Evansville.

The field is marked with a forty-foot circle in the center and gas and oil are available, with hangar space for four planes. The Garrison Airport welcomes all visiting pilots.

Hissos and OX5 Standards have been used all summer, but faster planes will be obtained soon, as passenger carrying and advertising work have recently called for several long trips.

Plane Stolen

Willard F. Bridgeman, of the United Aircraft Corporation, Ottawa, Ill., found Oct. 5 on reaching the field where his Eaglerock had been left the night before that an airplane thief had been busy and flown his plane away. The field is situated one mile south of Ottawa.

Mr. Bridgeman is offering a reward of $500. for the capture of the thief and plane, or the return of the plane.

First Aerial Police

Sheriff Traeger, of Los Angeles County, Cal., administered the oath of office early in October, to five members of the Aero Corporation of California, creating what is believed to be the world's first regularly appointed and organized squad of aerial police.

Special facilities have been arranged between the sheriff's headquarters and the flying field and the flying sheriffs will take part in all pursuits in which criminals seek to evade arrest. Not only will the aero squad enforce the laws, but they will also apprehend violators of air statutes.

Cargo of Goods By Air

A plane of the Colonial Air Transport Co., flying from the field at Hasbrouck Heights, N. J., at 9:15 a. m., with a consignment from the Associated Dry Goods Corp. to J. N. Adam & Co., Buffalo, reached that city in the afternoon and delivered a cargo of dresses, coats, hosiery, gloves, silks, millinery, shoes, shirts, jewels, bags and novelties.

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Across Canada in a Seaplane

A Douglas seaplane, equipped only with pontoons for water landings, recently flew across Canada from the East to the West coast.

The seaplane, piloted by Major Godfrey, of the Canadian Royal Air Force, was making a trip from the East coast to the Douglas Airplane Factory, in California, and stopped at Sand Point for refueling. J. A. McKee, of Pittsburgh, Pa., made the flight with Major Godfrey.

United States Air Forces

Santa Monica, Cal.

The second annual Round-the-World Commemoration Air Meet was held at Clover Field, Sept. 26. Chief among the events was the Round-the-Southland Race, which was open to all types of planes, military and civilian. This race was held over a course that measured 131 miles in length. It started at Clover Field, the planes flying to Long Beach, then to Santa Ana Airport, Arlington Airport, Alhambra Airport, and over the Western Air Express Field to Clover Field. There were two main entry divisions, military and civilian, and these were in turn divided. Observation planes formed class 1, in the military division, and training planes class 2. In the civilian division there were three classes: planes with 185 h. p. or more, planes with 110 h. p. to 185 h. p., and planes with 110 h. p. or less.

In the military division, Lieut. Paul S. Woodruff was winner and made the course in 69 minutes. This was also the fastest time regardless of class or division. Lieut. Woodruff received both the Santa Monica American Legion perpetual trophy, for fastest time, and the D. E. McDaneld Packard Trophy for the best time in the observation class. Lieutenant C. Y. Haynes was second. Lieut. N. Schramm third, Lieut. W. J. Wallace fourth and Lieut. L. B. Gregg fifth.

The training type class was won by Lieut. H. E. Shea, with a record of 95 minutes, 5 seconds, Lieut. C. L. Hussey was second, Lieut. M. Murphy third, ieut. Ray Harding fourth, Lieut. Earl W. Clark fifth and Lieut. R. E. Kennedy sixth.

Leo Nomis, piloting Victor Fleming's C. F. 15 biplane, took first place in the Civilian class 2. Second place was won by L. M. Bach, in Reginald Balmer's plane.

The Alexander Eaglerock, piloted by Lieut. Paul E. Richter, Jr., of the Aero Corporation of California, with Lee Willey as observer, won first place in the Civilian class 3, completing the race in 100 minutes, 29 seconds. Lieutenant Richter was awarded the Civilian Sweepstakes Trophy, offered by the Western Flying Magazine. Other prizes for the winner of this class were the Reginald Denny Trophy and $200 in cash. Second in this class was the Fisk Sport, piloted by Frank Clark. K. W. Montee was third, Art Goebel fourth, Eddie Blomde fifth and Harris H. Roake sixth.

After the air meet there was a banquet for all the fliers and it was here that the prizes and trophies were awarded to the winners. More than twenty thousand people were present at the air meet.

Detail and Transfer of Officers to the Air Corps

Section 2 of the Act of Congress approved July 2, 1926, commonly referred to as "The Air Corps Bill", provides that in time of peace, in order to insure that the commissioned officers of the Air Corps shall be properly qualified flying officers, and for the purpose of giving officers of the Army an opportunity to so qualify, the Secretary of War is au-

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thorized to detail to the Air Corps from other branches of the service officers of all grades. Such officers shall be given flying training immediately upon being so detailed, but shall not remain detailed to the Air Corps for more than one year, or be permanently commissioned therein unless they qualify as flying officers. However, individual officers specifically recommended because of special qualifications other than as fliers may be detailed or permanently commissioned in the Air Corps.

There are now a considerable number of vacancies in every grade in the Air Corps and the War Department is desirous of filling them as early as practicable. Therefore, all officers interested in the Air Corps, and having qualifications therefor, have been urged to submit their applications for transfer.

Lieutenant Doolittle Returns from Buenos Aires

Lieutenant James H. Doolittle, Air Corps, who has been at Buenos Aires, A.R., giving demonstration flights of pursuit planes, has returned to his post at McCook Field.

Lieutenant Doolittle is the first American flier to successfully cross the Andes Mountains.

Executive to Asst. Sec. Davison Appointed

Lieut. Lester J. Maitland, Air Corps, who has been on duty at Wright Field, Fairfield, Ohio, has been appointed assistant executive to Mr. Davison, Assistant Secretary of War for Aeronautics. Lieutanant Maitland reported for duty in Washington recently.

Patents and Design Board Meets

A board to consider aviation patents and designs, consisting of three Assistant Secretaries for Aviation, met recently in Washington for the first time at the National Advisory Committee for Aeronautics.

Assistant Secretary F. Trubee Davison, of the War Department, presided, and Assistant Secretary Edward P. Warner acted as recorder. The board examined a few of the many designs submitted.

The board was provided for in the national defense act of July 2, 1926.

Repair Work at San Antonio, Tex.

Information has been received to the effect that the Air Corps Engineering Department of the San Antonio Air Intermediate Depot overhauled and repaired 22 airplanes and 73 engines in July. Of the engines repaired, 24 were of the Liberty-12 type, and the remaining 49 of the Wright E type.

In addition to the regular work on airplanes for Air Corps activities in the Eight Corps Area, the depot received instruction to prepare one VE-9 plane for the Air Corps Instructor at Birmingham, Ala.; one of the same type for Langley Field, Va.; one for Norton Field, Columbus, Ohio, and one for Hartford, Conn. These planes recently were delivered.

Another steel hangar, 200 by 110 ft. is nearing completion at the San Antonio base. This hangar will add materially to the working space in the Engineering Department.

Housing Facilities at Fort Sam Houston

Much activity is now centered upon the improvement of buildings and housing facilities for the personnel of the 2nd Division Air Corps at the Fort Sam Houston Airdrome, which upon arrival there on June 23 last were very poor and inadequate. A new officers' mess building is now under erection and is nearing completion, filling a long felt want, as most of the officers on the post are unmarried or else living in the city of San Antonio, too far to go home for lunch and return for the afternoon duties. An officers' lounging room will be attached to the dining room, and as the building is very close to the hangars this arrangement is expected to prove quite convenient.

A Headquarters building, large enough to accommodate all sections of the 2nd Division Air Corps, First Photo Section and 12th Observation Squadron, Operations Office and Sur-

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30 gallon steel drums, per gallon - - 1.40
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5 gallon cans, per gallon, $1.75 1 gallon cans, per gallon, $1.85
Add 75c for 5 gallon containers and 25c for 1 gallon containers. Immediate delivery, best results. This is not a cheap or inferior grade of dope, but is of the highest quality obtainable. These exceptionaly low prices are made possible by the fact that we contract for dope in carload quantities and pass the saving on to our customers.

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NEW OX5 AND OXX6 PARTS—NEW

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geon's Office, is being reconstructed from an old building formerly used as married enlisted men's quarters of the old Remount Station. This building has been moved to within about 40 yds. from the line of hangars and flying field and will add to time saving, convenience and centralization of all activities of the station. A large garage for the housing of all motor vehicles is also under erection, with the assistance of the 2nd Engineers at this post. A Recreation and Reading Room for enlisted men is now nearing completion, so that by the time the northers start blowing, which sometimes happens in this land of perpetual sunshine, everybody will be quite comfortable.

Aircraft Radio Satisfactory

The new combined aircraft transmitter-receiver type SE-1375A set designed and manufactured by the Washington (D.C.) Navy Yard was tested recently and the following comparisons were made with the old type SE-1375:

1. Antenna imput about 50 per cent greater than old model SE-1375.
2. Practically equal on all frequency taps.
3. Receiver only one-half size and weight of old model and contains the plate batteries.
4. Outside dimensions of transmitter-receiver case remain same as the old 1375 although parts of present Special Unit have been incorporated doing away with Special Unit.

Army Air Orders

Following officers, Air Corps Res., to active duty from Detroit, Mich. They will report to Air Corps procurement planning representative, Detroit, and revert to inactive status November 21.

Capt. Louis Stoker Connelly, Air Corps Res., Dayton, to active duty McCook Field, reverting to inactive status November 21.

Capt. George Enoch Harris, Air Corps Res., Buffalo, to active duty Air Corps procurement planning representative, Buffalo, reverting to inactive status November 21.

Capt. William Stoneman Lyhne, Air Corps Res., Richmond, Va., and Capt. Leopold Stocker, Air Corps Res., Washington, to active duty Air Corps procurement planning representative, New York, reverting to inactive status November 21.

Capt. John Jay Davis, Air Corps Res., Oshkosh, to active duty Air Corps procurement planning representative, Chicago, reverting to inactive status November 21.

Capt. Edgar Raymond Theiss, Air Corps Res., to active duty Air Corps procurement planning representative, Chicago, reverting to inactive status November 21.

Marine Corps Air Orders

First Lieut. T. J. Cushman det. N.A.S., Pensacola, to N.A.S., N.O.B., San Francisco.

Navy Air Orders

Lieut. Joseph W. Baker, det. Nav. Train. Sta., Nav. Oper. Base, Hampton Roads, to Nav. Air Sta., Nav. Oper. Base, Hampton Roads.

Lieut. Comdr. Harold T. Bartlett det. 4th Nav. Dist., Phila., to command Setg. Sqd. 2 (VS-2) Aircraft Sqdns., Battle Flt.

Lieut. Comdr. Wallace L. Lind det. U.S.S. Arizona, to temp. duty, Nav. Air Sta., Pensacola.

Lieut. Byron J. Connell det. Bu. Aero. to duty with Setg. Sqd. 2 (VS-2), Aircraft Sqdns., Battle Flt.

Lieut. Lawrence W. Curtin det. c.f.o., PN-10 planes, to duty with Sqd. 2 (VS-2), Aircraft Sqdns., Battle Flt.

Lieut. Herbert C. Rodd det. Bu. Eng., to duty with Setg. Sqd. 2, (VS-2), Aircraft Sqdns., Battle Flt.

Lieut. Clarence H. Schildhauer det. Nav. Aircraft Factory, Navy Yard, Phila., to duty with Setg. Flt. Sqd. 2 (VS-2) Aircraft Sqdns., Battle Flt.

Lieut. Walter W. Gilmore det. U.S.S. Camden, to Nav. Air Sta., Pensacola.

Chief Bos'n., George R. Groh det. Nav. Air Sta., Nav. Oper. Base, Hampton Roads, to c.f.o., U.S.S. Lexington.

Lieut. Leslie E. Gehres det. 11th Nav. Dist., San Diego, to temp. duty Nav. Air Sta., Pensacola.

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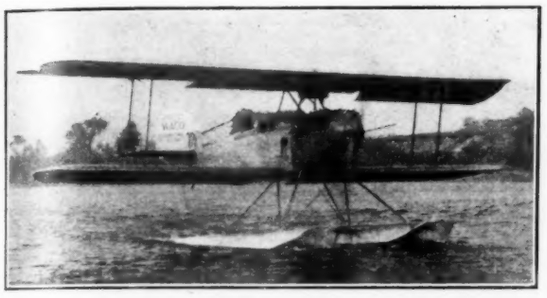

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PUBLISHER'S NEWS LETTER

At this time of the year, all publishers make preparations for the handling of a very large number of renewals of subscriptions. The first of every year brings many expirations of subscriber's orders, and it is to bring to their attention some of the advantages of prompt renewal that this is written. During 1926, the increase in the number of copies of AVIATION that have been circulated has been very large. There are twice as many readers now as two years ago. With this growth has come a new problem that will probably interest many who wish to keep their files of AVIATION complete.

* * * *

When a subscription expires and is not renewed promptly, a request is made when the renewal does arrive that the missing issues be supplied. And it is this request that causes much disappointment to our readers. As practically every issue of AVIATION for the last few months has been sold out one or two days after publication, the furnishing of the missing issues has been impossible, and there are many files of the publication that are still incomplete for that reason. There is such a great advantage in letting the subscription department know promptly regarding renewals that it is believed that this reminder will save much disappointment. If you wish to discontinue your subscription for any reason, a letter indicating your wishes would be greatly appreciated, although, of course, received with regret.

* * * *

There is only one way to make sure that you will receive every copy of AVIATION, and that is to renew your subscription on receipt of the first notification of expiration. Many of our readers who wish to be certain that through no oversight on their part they will not miss a copy, send their renewal order in advance. And some of our subscribers who live in distant countries, where mail takes a month or more to go and return, do this in large numbers. These suggestions regarding subscriptions are made at this time, on this page, because of the many who have, through neglect, felt that the publisher should keep a large stock of back numbers on hand to fill their needs. That could be done if the number of subscribers were not increasing so rapidly, but with the situation as it is now, no other plan is possible. To ascertain when your subscription expires, it is only necessary to look at the wrapper in which your issue comes to you. It appears on the bottom line reading from the right and shows the year, the date and month, as "3 28 27" indicates that the subscription expires March 28, 1927.

* * * *

Possibly the large increase of the subscription list has come from those who have formerly purchased copies on the newsstands. To buy an issue every week from a newsdealer would cost $7.80, while the subscription price is only $4.00, a saving of nearly 50%. Here, too, we hear of AVIATION being sold out on the newsstands and back numbers requested. There is only one way of getting your issues regularly and without a break, and that is to subscribe and receive your issues through the mail. And, then, to send your renewals promptly. At this time, the publishers wish to express their appreciation for the continued interest shown in AVIATION by readers, and hope that during the coming year, they may make the issues for 1927 even more interesting and valued.

—L.D.G.

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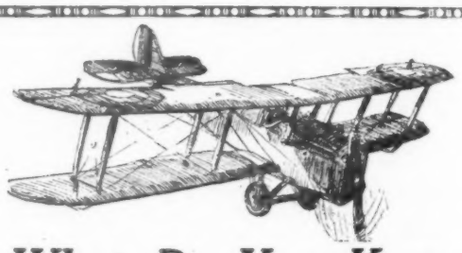

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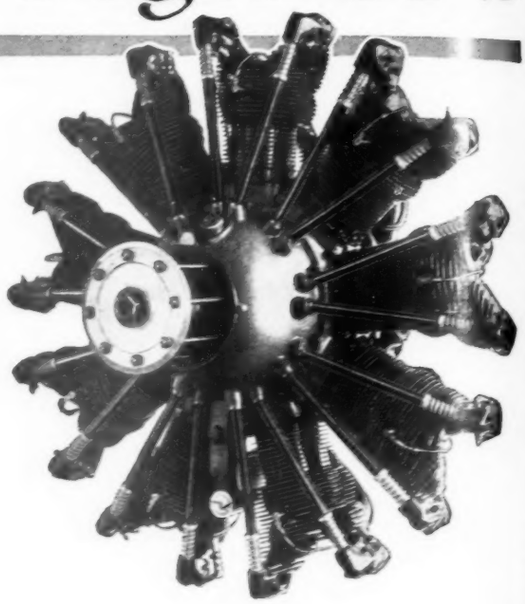

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